



Part I. 選擇題(每題 2 分，共 30 分)

1. _____ added to _____ equals IT infrastructure.
A) IT components, IT services
B) IT components, IT personnel
C) IT services, IT personnel
D) IT personnel, computer-based information systems
2. Supply chain systems are which type of information system?
A) departmental information systems
B) enterprisewide information systems
C) interorganizational information systems
D) end-user computing systems
E) individual information systems
3. Porter's _____ help(s) companies identify general strategies, where his _____ help(s) to identify specific activities where companies can use the strategies for greatest impact.
A) value chain model, competitive forces model
B) primary activities, support activities
C) competitive forces model, primary activities
D) competitive forces model, value chain model
E) value chain model, support activities
4. The role of the director of the Information Systems Department is changing from more _____ to more _____.
A) hands-on, managing
B) technical, managerial
C) operational, strategic
D) hands-on, decision-making
E) managerial, technical
5. In the relational database model, related tables can be joined when they contain common _____.
A) primary keys
B) rows
C) records
D) columns
E) files
6. _____ provide(s) companies with a single version of the truth for their data.
A) Data warehouses
B) Data marts
C) Databases
D) Master data management
E) Enterprise information management



7. Workflow, groupware, and telepresence systems are examples of which network application?
- A) Discovery
 - B) Communications
 - C) Collaboration
 - D) Web services
 - E) None of the above
8. Which type of electronic commerce is the largest by volume?
- A) business-to-employee
 - B) consumer-to-consumer
 - C) business-to-business
 - D) business-to-consumer
 - E) none of the above
9. _____ systems support the front-office business processes which directly interact with customers.
- A) CRM
 - B) Collaborative CRM
 - C) Operational CRM
 - D) Analytical CRM
 - E) Transactional CRM
10. _____ refers to online word-of-mouth marketing.
- A) Permission marketing
 - B) One-to-one marketing
 - C) Personalized marketing
 - D) Viral marketing
 - E) Direct mail
11. _____ are short-term efforts to create a specific business-related outcome.
- A) Projects
 - B) Processes
 - C) Transactions
 - D) Prototypes
 - E) Information systems
12. The most fundamental information systems in an organization are:
- A) office automation systems
 - B) decision support systems
 - C) functional area information systems
 - D) transaction processing systems
 - E) business intelligence systems



13. Which of the following systems acquisition methods helps clarify user requirements, promotes genuine user participation, and may produce part of the final system?
- A) systems development life cycle
 - B) prototyping
 - C) end-user development
 - D) external acquisition
 - E) component-based development
14. _____ integrate the planning, management, and use of all of an organization's resources, and are designed to tightly integrate the functional areas of the organization.
- A) Transaction processing systems
 - B) Supply chain management systems
 - C) Functional area information systems
 - D) Enterprise resource planning systems
 - E) Corporate extranets
15. As an MIS analyst, you have decided to use a prototyping methodology for a small, Web-based design project. What is the order of steps that you will follow in the project?
- A) Develop the prototype; use the prototype; revise and enhance the prototype
 - B) Identify user requirements; develop the prototype; use the prototype; revise and enhance the prototype
 - C) Develop the prototype; identify user requirements; use the prototype; revise and enhance the prototype
 - D) Identify user requirements; develop solutions; select the best prototype; implement the prototype
 - E) Identify user requirements; develop the prototype; revise and enhance the prototype

Part II. 問答與申論題 (共 70 分)

1. Define synergies, core competencies, and network-based strategies (10%); give examples to describe ways information systems help apply these to achieve competitive advantages (5%); comment on the sustainability of the created competitive advantages (5%).
2. From the concept of service-oriented paradigm, there is a need for software development methodologies that can thrive in hybrid use of both plan-driven and agile techniques to achieve better fit between information technology project risk, interdependencies, and the selected methodologies in order to improve overall information technology project performance. Please describe the basic stages of service-oriented methodology for software development (15%) and map into traditional systems development life cycle (SDLC) phases (5%).



國立雲林科技大學 103 學年度
碩士班招生考試試題

系所：資管系

科目：資訊管理導論

3. Please describe the essential elements of social commerce and their inter-relationships. (10%).
4. A lack of adaptability between collaborative partners may lead to poor performance in a highly competitive market. What should supply chain members reinforce and in turn enhance the inter-organizational innovation performance for the electronic supply chain. Describe a theoretical model from four or five conceptions as followings (15%) and practical implications (5%).
 - a. Information Technology Integration
 - b. Dynamic Capabilities
 - c. Innovation Performance
 - d. Supply Chain Agile
 - e. Absorptive Capacity
 - f. Information Technology Infrastructure Flexibility
 - g. Relationship orientation



本試題共三大題，共計 100 分，請依題號作答並將答案寫在答案卷上，違者不予計分。

一、選擇題一：70%（共 35 題，每題 2 分；答案請採橫式書寫，每行 5 題）

1. Which of the following memory management schemes solved internal fragmentation?
 - (A) Paged memory allocation
 - (B) Fixed partition
 - (C) Segmented memory allocation
 - (D) None of the above

2. Which of the following concepts is best at preventing page faults?
 - (A) Paging
 - (B) The working set
 - (C) Hit ratios
 - (D) Address location resolution

3. Which of the following is a portion of the program that can run independently of other programs?
 - (A) Kernel
 - (B) Thread
 - (C) Firmware
 - (D) Part

4. Which of the following layers of the OSI reference model provides an interface to the users?
 - (A) Layer 1
 - (B) Layer 7
 - (C) Network access layer
 - (D) Host-host layer

5. Which of the following algorithms employ the concept of a time quantum that is given to each job to ensure that the CPU is equally shared among all active processes?
 - (A) SRT
 - (B) SJN
 - (C) Round robin
 - (D) Priority scheduling

【下頁尚有試題】



6. Which of the following storage devices uses phase change technology to write data?
(A) Magnetic tape
(B) CD-R discs
(C) CD-RW discs
(D) Magnetic disks
7. Which of the following protocols selects a path based on the immediate number of nodes, or hops, between the source and destination?
(A) Open shortest path first
(B) Routing information protocol
(C) CSMA/CD
(D) CSMA
8. Which of the following is true about packet switching? (Choose all that apply.)
① Shared by many transmissions ③ Transmits in real time
② Preferred in low volume networks ④ High line efficiency
(A) ②③ (B) ①②③④ (C) ①③④ (D) ①④
9. Which of the following accurately describe NOS? (Choose all that apply.)
① Provides a unified environment designed to optimize operations for the network as a whole, not just for local sites.
② Coordinates communications between the local operating systems.
③ Handles interfacing details and coordinates remote processing.
④ Doesn't take global control over memory management.
(A) ②③④ (B) ①②③④ (C) ①③④ (D) ①②④
10. Which of the following is true? (Choose all that apply.)
① AAC or WMA technology can have better sound quality than a comparable MP3 file.
② AAC, WMA and OGG offer options for including DRM in uncompressed files.
③ WAV, AIFF are standard formats for uncompressed audio.
④ OGG technology can have better sound quality than an AAC file.
(A) ①②③ (B) ②③④ (C) ②④ (D) ①③

【下頁尚有試題】



11. The simultaneous communication process between a mainframe and several users is known as
- (A) timesharing.
 - (B) networking.
 - (C) serving.
 - (D) processing.
12. Computers grew out of a need to
- (A) improve quality of life.
 - (B) quantify.
 - (C) socialize.
 - (D) communicate.
13. Which of the following is NOT a reason that integrated circuits replaced transistors?
- (A) speed
 - (B) cost
 - (C) availability
 - (D) size
14. _____ makes it possible for users with diverse computing needs to share expensive computing equipment.
- (A) Shareware
 - (B) Virtual Sharing
 - (C) Timesharing
 - (D) Network Sharing
15. What character/number does ASCII binary code 0 0 1 1 0 1 1 0 translate to?
- (A) 6
 - (B) 10
 - (C) 100
 - (D) 8
16. The design that determines how individual components of the CPU are put together and work together on the chip is called the
- (A) construction
 - (B) detailed plan
 - (C) motherboard
 - (D) architecture



17. A computer's overall performance is determined by
- (A) Level 1 and Level 2 cache.
 - (B) CMOS and cache memory.
 - (C) peripheral and internal devices.
 - (D) clock speed, architecture, and wordsize.
18. The process of creating colors by combining colored lights is called _____ color synthesis.
- (A) RGB
 - (B) Hexadecimal codes
 - (C) additive
 - (D) Monochrome
19. An analog-to-digital converter (ADC) converts electrical charges into
- (A) discrete values.
 - (B) analog clusters.
 - (C) midi files.
 - (D) .wav files.
20. FireWire allows
- (A) multiple devices to be connected to the same port.
 - (B) only one device to be connected.
 - (C) power to be provided to iLinks.
 - (D) the cloud to function.
21. This allows multiple operating systems to exist as one machine:
- (A) cross-platform applications.
 - (B) virtualization.
 - (C) device drivers.
 - (D) networked operating systems.
22. A(n) _____ program translates all Windows-related instructions into instructions the Mac's operating system and CPU can understand.
- (A) Macintosh
 - (B) emulation
 - (C) translation
 - (D) iOS



23. What type of font looks fine on a monitor but is not smooth when printed?
- (A) bitmapped
 - (B) TrueType
 - (C) OpenType
 - (D) unscalable
24. In Excel, an example of a formula with an absolute reference is
- (A) =B4*B5.
 - (B) =^b^4*^b^5.
 - (C) =@b@4*@b@5.
 - (D) =\$b\$4*\$b\$5.
25. Although using computer simulations for training have many advantages, a major disadvantage is
- (A) the cost far outweighs any disadvantage.
 - (B) it is not reality.
 - (C) the time required for training.
 - (D) personnel needed to oversee the training.
26. Techniques that were used in films such as Up and Avatar have pioneered efforts in live action and
- (A) augmented reality.
 - (B) virtual reality.
 - (C) 3-D animation.
 - (D) data compression.
27. Which of the following statements is true of bitmapped image-editing programs?
- (A) Bitmapped image-editing programs are able to use lines and shapes and move them without affecting those objects around them.
 - (B) Bitmapped image-editing programs give photo editors more control over textures.
 - (C) Bitmapped image-editing programs are an American standard, and are not used in Europe.
 - (D) Bitmapped image-editing programs are generally inexpensive or free.



28. The difference between augmented reality and virtual reality is
- (A) virtual reality is a newer format that was developed as an offshoot of augmented reality research.
 - (B) augmented reality has no real use in today's world.
 - (C) virtual reality creates the illusion of tweening.
 - (D) augmented reality supplements rather than replaces the world the user sees.
29. A database that stores data in "cubes" rather than tables is known as a(n) _____ database.
- (A) flat
 - (B) multidimensional
 - (C) object-oriented
 - (D) relational
30. All of the following are benefits of record matching EXCEPT:
- (A) easier to establish reputations in getting credit for consumers.
 - (B) allows systems like the U.S. National Crime Information Center to function.
 - (C) easier to use credit cards around the world.
 - (D) data is more secure.
31. The difference between application programs and development tools is blurred through the use of _____ in databases.
- (A) saved reports.
 - (B) stored queries.
 - (C) parameter queries.
 - (D) triggers.
32. Google's original algorithm was written to improve the way search engines looked for Web pages by
- (A) counting the number of times other related Web pages linked to it.
 - (B) counting the number of times the key word or phrase appeared on the page.
 - (C) counting the number of hits the page had received from the linked page.
 - (D) having humans examine and rate each page.



33. _____ is connectivity software that hides the complex interaction between client and server computers and creates a three-tier design separating actual data from the programming logic used to access it.
- (A) SQL
 - (B) Groupware
 - (C) Middleware
 - (D) Firmware
34. The _____ encryption scheme improves the security of wireless networks.
- (A) WPA
 - (B) phishing
 - (C) VPN
 - (D) WEP
35. A(n) _____ network is often used to set up a temporary communications system that requires no centralized router.
- (A) local area
 - (B) wide area
 - (C) mesh
 - (D) metropolitan area

【下頁尚有試題】



二、選擇題二：15%（共 15 題，每題 1 分；答案請採橫式書寫，每行 5 題）

1. Which of the following techniques makes files much faster and easier to read?
 - (A) Location transparency
 - (B) Distributed directory
 - (C) Data redundancy
 - (D) Query processing

2. Which of the following attacks denies service to authorized users by causing a computer to perform a task (often an unproductive task) repeatedly, thereby making the system unavailable to perform the work it is designed to do?
 - (A) Browsing
 - (B) Trojan horse
 - (C) DoS
 - (D) Trapdoors

3. Reliability is a function of which of the item(s) listed below?
 - (A) MTBF
 - (B) MTTR
 - (C) Throughput
 - (D) All of the above

4. Rapid application development, or RAD, includes each of the following features EXCEPT:
 - (A) more formality in documentation and team communication.
 - (B) re-using software components.
 - (C) prototyping early and repeated testing.
 - (D) active user involvement through the use of workshops and focus groups to gather information.

5. An entity-relationship diagram depicts which of the following?
 - (A) The relationship between the data in the database and the information that is obtained from it.
 - (B) The relationship between the users of the database and their level and role within the company.
 - (C) All of the organizations, departments, users, programs, and data that play a role in the system and the relationships between them.
 - (D) The relationship between the relevant data types in the system.



6. A request for proposal (RFP) document:
- (A) analyzes the information needs of end users.
 - (B) asks a potential supplier to document the design, installation, and configuration of its proposed system.
 - (C) considers the costs and benefits of different system proposals.
 - (D) requests that the company stockholders approve the proposed system.
7. All of the following are true of object-oriented programming EXCEPT:
- (A) it is easy to use features from one program in another program.
 - (B) many computer scientists believe relational databases will be replaced by object-oriented databases.
 - (C) it supports hierarchical categorization of objects so that a new object can inherit properties and methods of the object from which it descends.
 - (D) it cannot be used with databases.
8. The phase of the systems development life cycle (SDLC) where the existing business problem or opportunity is studied is
- (A) analysis.
 - (B) investigation.
 - (C) development.
 - (D) design.
9. _____ feasibility may determine whether the changes in work procedures required by the proposed system are acceptable or not.
- (A) Technical
 - (B) Operational
 - (C) Economic
 - (D) Organizational
10. A new experimental approach to software development in which each system is developed individually and quality is certified before it is integrated with other systems is called _____ programming.
- (A) clean-room
 - (B) structured
 - (C) component
 - (D) object-oriented

【下頁尚有試題】



11. A(n) _____ system is a record-keeping system that keeps track of business dealings on a daily basis.
- (A) interorganizational information
 - (B) executive information
 - (C) transaction processing
 - (D) expert
12. An enterprise resource planning system
- (A) increases the quality of the data of a transaction subsystem.
 - (B) decreases the costs for a business.
 - (C) increases information sharing between business processes.
 - (D) decreases the complexity of business systems.
13. The Code Red worm attacked
- (A) UNIX operating systems.
 - (B) Microsoft Word.
 - (C) Microsoft server software.
 - (D) personal computers.
14. When you visit certain Web sites, spyware may be automatically downloaded. This is called a
- (A) botnet.
 - (B) spybot.
 - (C) logic bomb.
 - (D) drive-by download.
15. A(n) ____ tests a condition at the beginning of the loop and repeats one or more times as long as the condition is true.
- (A) if-then-else control structure
 - (B) case control structure
 - (C) do-while control structure
 - (D) do-until control structure

【下頁尚有試題】



國立雲林科技大學 103 學年度
碩士班招生考試試題

系所：資管系
科目：計算機概論(3)

三、問答題：15%

1. 請列出影響頻寬(Bandwidth)的因素?(7%)
2. 請完成以下各無線網路標準之Popular Name、Technology (應用技術)，請繪製本表於答案卷上作答。(8%)

| Technical name | Popular Name | Technology |
|----------------|--------------|------------|
| IrDA-Data | | |
| 802.15 | | |
| 802.11 | | |
| 802.16 | | |

【試題結束】



1. 某位教授宣稱如果用中序走法(inorder traversal)的作法，可以將一個Heap結構的樹，列印出大小排序好的順序，試以畫圖說明的方式，舉証他的說法是「錯的」。(5分)
2. 假設有一個未經排序的二元樹，其每個節點的值均為一個正整數值，請寫一個遞迴的程式，計算其平均值，並在所有比平均值低的節點中找出最大值的節點值(15分)。
3. 將右列的值6, 7, 2, 1, 4, 5, 9, 3，依序插入一個最初為空的AVL樹，並顯示將每個值插入AVL樹的結果(註：如果樹需要作旋轉動作的話，請顯示旋轉前、旋轉之間、旋轉之後的結果)。(15分)
4. 請寫出下列程式的執行結果(15分)

```
#include <stdio.h>
#include <stdlib.h>
int hanoi (int, char, char, char);
main ()
{
    int n, count;
    n=3;
    count=hanoi(n, 'A', 'B', 'C');
    printf("共搬移%d 次\n", count);
    system("PAUSE");
    return 0;
}

int hanoi(int n, char A, char B, char C)
{
    static int x=0;
    if(n == 1)
    {
        printf("move sheet %d from %c to %c \n", n, A, C);
        x=x+1;
    }
    else
    {
        hanoi(n-1, A, C, B);
        printf("move sheet %d from %c to %c \n", n, A, C);
        hanoi(n-1, B, A, C);
        x=x+1;
    }
    return x;
}
```




5. List the following functions according to their order of growth from the lowest to the highest: (10分)

$$0.05n^{10} + 5^{n^5} + 1, \ln^3 n, (n^2 + 20)!, 8 \lg(n + 35)^6, 5^{3n}, \sqrt{n}, 5^{5n}$$

6. (a) Apply algorithm *XYZ* to the array $A[0..n-1]$ of values: 50, 80, 70, 30. What are the final values in array S and array T ? (15分)
 (b) Please analyze time complexity of algorithm *XYZ*. (5分)

Algorithm *XYZ*($A[0..n-1]$, $S[0..n-1]$)

//Input: Array $A[0..n-1]$ of values

//Output: Array $S[0..n-1]$

for $i \leftarrow 0$ **to** $n - 1$ **do**

$T[i] \leftarrow 0$

for $i \leftarrow 0$ **to** $n - 2$ **do**

for $j \leftarrow i + 1$ **to** $n - 1$ **do**

if $A[i] < A[j]$

$T[j] \leftarrow T[j] + 1$

else $T[i] \leftarrow T[i] + 1$

for $i \leftarrow 0$ **to** $n - 1$ **do**

$S[T[i]] \leftarrow A[i]$

7. (a) Please write a routine in pseudo-code to insert a key to a hash table by using a hash function with quadratic probing for collision. (8分)
 (b) Please write a routine in pseudo-code to search a key from the hash table constructed in (a). (7分)
8. Consider the sequence of keys (6, 4, 12, 15, 3, 5, 10, 8). Please draw the result of inserting entries with these keys in the given order into an initially empty (2, 4) tree. (5分)



1. (5 分) Identify the scale of measurement (nominal, ordinal, interval, or ratio) for the following variables.
 - (A) Time required completing a special task.
 - (B) Brand of cigarettes most often purchased.
2. (10 分) Before marketing new products nationally, companies often test them on samples of potential customers. Such tests have a known reliability. For a particular product type, a test will indicate success of the product 75% of the time if the product is indeed successful and 15% of the time when the product is not successful. From past experience with similar products, a company knows that a new product has 0.6 chance of success on national market. If the test indicates that the product will be successful, what is the probability that it really be successful?
3. (5 分) A shipment of 24 electric component is rejected is 3 checked for defects and at least 1 is found to be defective. Find the probability that the shipment will be returned if there are actually 6 components are defective.
4. (10 分) Let Y_1 be the amount of pollutant per sample collected above the stack without the cleaning device and Y_2 be the amount collected above the stack with the cleaner. The joint density of Y_1 and Y_2 is

$$f(y_1, y_2) = \begin{cases} 1, & 0 \leq y_1 \leq 2, 0 \leq y_2 \leq 1, 2y_2 \leq y_1 \\ 0, & \text{elsewhere.} \end{cases}$$

The random variable $(Y_1 - Y_2)$ represents the amount by which the weight of pollutant can be reduce by using the cleaning device. Find $E(Y_1 - Y_2)$.

5. (10 分) The length of time a battery lasts in a radio is normally distributed with a mean of 15.6 hours and a standard deviation of 0.85 hours.
 - (A) For a randomly selected battery, what is the probability it lasts more than 17 hours?
 - (B) Find the length of time, x_0 , for which 80% for batteries last less than x_0 .
6. (10 分) A survey by the Society for Human Resource Management asked 346 job seekers why employees change jobs so frequently. The answer selected most 152 times was "higher compensation elsewhere".
 - (A) What is the point estimate of the proportion of job seekers who would select "higher compensation elsewhere" as the reason for changing jobs?
 - (B) What is the 98% confidence interval estimate of the population proportion?



7. (15 分) Consider the following data.

| | | | | | | | |
|---|---|----|----|----|----|----|----|
| x | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| y | 8 | 17 | 29 | 34 | 46 | 42 | 52 |

(A) Fit a regression curve of the form $E(Y|x) = \beta_0 + \beta_1 x$.

(B) Use the following information to estimate the model of the form $E(Y|x) = \beta_0 + \beta_1 x + \beta_2 x^2$.

$$(X'X)^{-1} = \begin{bmatrix} 2.428571 & -1.28571 & .1428571 \\ -1.28571 & .797619 & -.0952381 \\ .1428571 & -.0952381 & .01190476 \end{bmatrix} \quad X'y = \begin{bmatrix} 228 \\ 1111 \\ 6091 \end{bmatrix} \quad \text{and } s^2 = 12.274$$

(C) Test an appropriate hypothesis with $\alpha = .05$ to decide whether the quadratic regression curve significantly fits the data better than the linear regression curve.

8. (10 分) Consider the random variable X with density given by

$$f(x) = (1 + \theta)x^\theta \quad 0 < x < 1 \quad \theta > -1$$

(A) Find the method of moments estimator for θ .

(B) Find the maximum likelihood estimator for θ .

9. (15 分) A quality engineer conducted an experiment to investigate the effect of experience on an assembly line in terms of average time required to complete an assembly task. If experience is found to be a factor, a training program is planned for newer employees. The engineer randomly selected five employees from groups who had completed 1, 2, 3, and 4 years of work experiences, respectively. He set up the experiment as a randomized block design with tasks as blocks and years of experiences as treatments. The assembly time data are given below.

| Task | Experiences | | | |
|------|-------------|---------|---------|---------|
| | 1 year | 2 years | 3 years | 4 years |
| 1 | 40.3 | 34.2 | 28.8 | 26.6 |
| 2 | 25.4 | 25.4 | 29.2 | 21.1 |
| 3 | 28.2 | 28.0 | 24.6 | 23.2 |
| 4 | 41.6 | 24.9 | 29.1 | 27.0 |
| 5 | 28.8 | 39.2 | 34.8 | 27.1 |

(A) Write the appropriate statistical model for this experiment.

(B) Test for any significant differences among years of experiences for average assembly time.

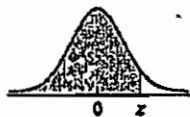
Use $\alpha = 0.05$.

(C) Was blocking necessary? Explain.

10. (10 分) While testing a used tape for bad records, a computer operator counted the number of flaws per 100 feet of tape. Let X equal this random variable. Test the null hypothesis that X has a Poisson distribution with a mean of $\lambda = 2.4$ given that 40 observations of X yielded 5 zeros, 7 ones, 12 twos, 9 threes, 5 fours, 1 five, and 1 six. Use $\alpha = 0.05$.



TABLE II (cont.)
Areas under the
standard normal curve



| z | Second decimal place in z | | | | | | | | | |
|-----|---------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 0.00 | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 |
| 0.0 | 0.5000 | 0.5040 | 0.5080 | 0.5120 | 0.5160 | 0.5199 | 0.5239 | 0.5279 | 0.5319 | 0.5359 |
| 0.1 | 0.5398 | 0.5438 | 0.5478 | 0.5517 | 0.5557 | 0.5596 | 0.5636 | 0.5675 | 0.5714 | 0.5753 |
| 0.2 | 0.5793 | 0.5832 | 0.5871 | 0.5910 | 0.5948 | 0.5987 | 0.6026 | 0.6064 | 0.6103 | 0.6141 |
| 0.3 | 0.6179 | 0.6217 | 0.6255 | 0.6293 | 0.6331 | 0.6368 | 0.6406 | 0.6443 | 0.6480 | 0.6517 |
| 0.4 | 0.6554 | 0.6591 | 0.6628 | 0.6664 | 0.6700 | 0.6736 | 0.6772 | 0.6808 | 0.6844 | 0.6879 |
| 0.5 | 0.6915 | 0.6950 | 0.6985 | 0.7019 | 0.7054 | 0.7088 | 0.7123 | 0.7157 | 0.7190 | 0.7224 |
| 0.6 | 0.7257 | 0.7291 | 0.7324 | 0.7357 | 0.7389 | 0.7422 | 0.7454 | 0.7486 | 0.7517 | 0.7549 |
| 0.7 | 0.7580 | 0.7611 | 0.7642 | 0.7673 | 0.7704 | 0.7734 | 0.7764 | 0.7794 | 0.7823 | 0.7852 |
| 0.8 | 0.7881 | 0.7910 | 0.7939 | 0.7967 | 0.7995 | 0.8023 | 0.8051 | 0.8078 | 0.8106 | 0.8133 |
| 0.9 | 0.8159 | 0.8186 | 0.8212 | 0.8238 | 0.8264 | 0.8289 | 0.8315 | 0.8340 | 0.8365 | 0.8389 |
| 1.0 | 0.8413 | 0.8438 | 0.8461 | 0.8485 | 0.8508 | 0.8531 | 0.8554 | 0.8577 | 0.8599 | 0.8621 |
| 1.1 | 0.8643 | 0.8665 | 0.8686 | 0.8708 | 0.8729 | 0.8749 | 0.8770 | 0.8790 | 0.8810 | 0.8830 |
| 1.2 | 0.8849 | 0.8869 | 0.8888 | 0.8907 | 0.8925 | 0.8944 | 0.8962 | 0.8980 | 0.8997 | 0.9015 |
| 1.3 | 0.9032 | 0.9049 | 0.9066 | 0.9082 | 0.9099 | 0.9115 | 0.9131 | 0.9147 | 0.9162 | 0.9177 |
| 1.4 | 0.9192 | 0.9207 | 0.9222 | 0.9236 | 0.9251 | 0.9265 | 0.9279 | 0.9292 | 0.9306 | 0.9319 |
| 1.5 | 0.9332 | 0.9345 | 0.9357 | 0.9370 | 0.9382 | 0.9394 | 0.9406 | 0.9418 | 0.9429 | 0.9441 |
| 1.6 | 0.9452 | 0.9463 | 0.9474 | 0.9484 | 0.9495 | 0.9505 | 0.9515 | 0.9525 | 0.9535 | 0.9545 |
| 1.7 | 0.9554 | 0.9564 | 0.9573 | 0.9582 | 0.9591 | 0.9599 | 0.9608 | 0.9616 | 0.9625 | 0.9633 |
| 1.8 | 0.9641 | 0.9649 | 0.9656 | 0.9664 | 0.9671 | 0.9678 | 0.9686 | 0.9693 | 0.9699 | 0.9706 |
| 1.9 | 0.9713 | 0.9719 | 0.9726 | 0.9732 | 0.9738 | 0.9744 | 0.9750 | 0.9756 | 0.9761 | 0.9767 |
| 2.0 | 0.9772 | 0.9778 | 0.9783 | 0.9788 | 0.9793 | 0.9798 | 0.9803 | 0.9808 | 0.9812 | 0.9817 |
| 2.1 | 0.9821 | 0.9826 | 0.9830 | 0.9834 | 0.9838 | 0.9842 | 0.9846 | 0.9850 | 0.9854 | 0.9857 |
| 2.2 | 0.9861 | 0.9864 | 0.9868 | 0.9871 | 0.9875 | 0.9878 | 0.9881 | 0.9884 | 0.9887 | 0.9890 |
| 2.3 | 0.9893 | 0.9896 | 0.9898 | 0.9901 | 0.9904 | 0.9906 | 0.9909 | 0.9911 | 0.9913 | 0.9916 |
| 2.4 | 0.9918 | 0.9920 | 0.9922 | 0.9925 | 0.9927 | 0.9929 | 0.9931 | 0.9932 | 0.9934 | 0.9936 |
| 2.5 | 0.9938 | 0.9940 | 0.9941 | 0.9943 | 0.9945 | 0.9946 | 0.9948 | 0.9949 | 0.9951 | 0.9952 |
| 2.6 | 0.9953 | 0.9955 | 0.9956 | 0.9957 | 0.9959 | 0.9960 | 0.9961 | 0.9962 | 0.9963 | 0.9964 |
| 2.7 | 0.9965 | 0.9966 | 0.9967 | 0.9968 | 0.9969 | 0.9970 | 0.9971 | 0.9972 | 0.9973 | 0.9974 |
| 2.8 | 0.9974 | 0.9975 | 0.9976 | 0.9977 | 0.9977 | 0.9978 | 0.9979 | 0.9979 | 0.9980 | 0.9981 |
| 2.9 | 0.9981 | 0.9982 | 0.9982 | 0.9983 | 0.9984 | 0.9984 | 0.9985 | 0.9985 | 0.9986 | 0.9986 |
| 3.0 | 0.9987 | 0.9987 | 0.9987 | 0.9988 | 0.9988 | 0.9989 | 0.9989 | 0.9989 | 0.9990 | 0.9990 |
| 3.1 | 0.9990 | 0.9991 | 0.9991 | 0.9991 | 0.9992 | 0.9992 | 0.9992 | 0.9992 | 0.9993 | 0.9993 |
| 3.2 | 0.9993 | 0.9993 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9994 | 0.9995 | 0.9995 | 0.9995 |
| 3.3 | 0.9995 | 0.9995 | 0.9995 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9996 | 0.9997 |
| 3.4 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9997 | 0.9998 |
| 3.5 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 | 0.9998 |
| 3.6 | 0.9998 | 0.9998 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 |
| 3.7 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 |
| 3.8 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 | 0.9999 |
| 3.9 | 1.0000† | | | | | | | | | |

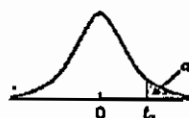
† For $z \geq 3.90$, the areas are 1.0000 to four decimal places.



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TABLE IV
Values of t_{α}



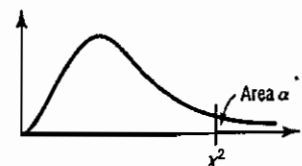
| df | $t_{0.10}$ | $t_{0.05}$ | $t_{0.025}$ | $t_{0.01}$ | $t_{0.005}$ | df |
|----|------------|------------|-------------|------------|-------------|----|
| 1 | 3.078 | 6.314 | 12.706 | 31.821 | 63.657 | 1 |
| 2 | 1.886 | 2.920 | 4.303 | 6.965 | 9.925 | 2 |
| 3 | 1.638 | 2.353 | 3.182 | 4.541 | 5.841 | 3 |
| 4 | 1.533 | 2.132 | 2.776 | 3.747 | 4.604 | 4 |
| 5 | 1.476 | 2.015 | 2.571 | 3.365 | 4.032 | 5 |
| 6 | 1.440 | 1.943 | 2.447 | 3.143 | 3.707 | 6 |
| 7 | 1.415 | 1.895 | 2.365 | 2.998 | 3.499 | 7 |
| 8 | 1.397 | 1.860 | 2.306 | 2.896 | 3.355 | 8 |
| 9 | 1.383 | 1.833 | 2.262 | 2.821 | 3.250 | 9 |
| 10 | 1.372 | 1.812 | 2.228 | 2.764 | 3.169 | 10 |
| 11 | 1.363 | 1.796 | 2.201 | 2.718 | 3.106 | 11 |
| 12 | 1.356 | 1.782 | 2.179 | 2.681 | 3.055 | 12 |
| 13 | 1.350 | 1.771 | 2.160 | 2.650 | 3.012 | 13 |
| 14 | 1.345 | 1.761 | 2.145 | 2.624 | 2.977 | 14 |
| 15 | 1.341 | 1.753 | 2.131 | 2.602 | 2.947 | 15 |
| 16 | 1.337 | 1.746 | 2.120 | 2.583 | 2.921 | 16 |
| 17 | 1.333 | 1.740 | 2.110 | 2.567 | 2.898 | 17 |
| 18 | 1.330 | 1.734 | 2.101 | 2.552 | 2.878 | 18 |
| 19 | 1.328 | 1.729 | 2.093 | 2.539 | 2.861 | 19 |
| 20 | 1.325 | 1.725 | 2.086 | 2.528 | 2.845 | 20 |
| 21 | 1.323 | 1.721 | 2.080 | 2.518 | 2.831 | 21 |
| 22 | 1.321 | 1.717 | 2.074 | 2.508 | 2.819 | 22 |
| 23 | 1.319 | 1.714 | 2.069 | 2.500 | 2.807 | 23 |
| 24 | 1.318 | 1.711 | 2.064 | 2.492 | 2.797 | 24 |
| 25 | 1.316 | 1.708 | 2.060 | 2.485 | 2.787 | 25 |
| 26 | 1.315 | 1.706 | 2.056 | 2.479 | 2.779 | 26 |
| 27 | 1.314 | 1.703 | 2.052 | 2.473 | 2.771 | 27 |
| 28 | 1.313 | 1.701 | 2.048 | 2.467 | 2.763 | 28 |
| 29 | 1.311 | 1.699 | 2.045 | 2.462 | 2.756 | 29 |
| 30 | 1.310 | 1.697 | 2.042 | 2.457 | 2.750 | 30 |
| 31 | 1.309 | 1.696 | 2.040 | 2.453 | 2.744 | 31 |
| 32 | 1.309 | 1.694 | 2.037 | 2.449 | 2.738 | 32 |
| 33 | 1.308 | 1.692 | 2.035 | 2.445 | 2.733 | 33 |
| 34 | 1.307 | 1.691 | 2.032 | 2.441 | 2.728 | 34 |
| 35 | 1.306 | 1.690 | 2.030 | 2.438 | 2.724 | 35 |
| 36 | 1.306 | 1.688 | 2.028 | 2.434 | 2.719 | 36 |
| 37 | 1.305 | 1.687 | 2.026 | 2.431 | 2.715 | 37 |
| 38 | 1.304 | 1.686 | 2.024 | 2.429 | 2.712 | 38 |
| 39 | 1.304 | 1.685 | 2.023 | 2.426 | 2.708 | 39 |
| 40 | 1.303 | 1.684 | 2.021 | 2.423 | 2.704 | 40 |
| 41 | 1.303 | 1.683 | 2.020 | 2.421 | 2.701 | 41 |
| 42 | 1.302 | 1.682 | 2.018 | 2.418 | 2.698 | 42 |
| 43 | 1.302 | 1.681 | 2.017 | 2.416 | 2.695 | 43 |
| 44 | 1.301 | 1.680 | 2.015 | 2.414 | 2.692 | 44 |
| 45 | 1.301 | 1.679 | 2.014 | 2.412 | 2.690 | 45 |
| 46 | 1.300 | 1.679 | 2.013 | 2.410 | 2.687 | 46 |
| 47 | 1.300 | 1.678 | 2.012 | 2.408 | 2.685 | 47 |
| 48 | 1.299 | 1.677 | 2.011 | 2.407 | 2.682 | 48 |
| 49 | 1.299 | 1.677 | 2.010 | 2.405 | 2.680 | 49 |



Table G The Chi-Square Distribution

| Degrees of freedom | α | | | | | | | | | |
|--------------------|----------|--------|--------|--------|--------|---------|---------|---------|---------|---------|
| | 0.995 | 0.99 | 0.975 | 0.95 | 0.90 | 0.10 | 0.05 | 0.025 | 0.01 | 0.005 |
| 1 | — | — | 0.001 | 0.004 | 0.016 | 2.706 | 3.841 | 5.024 | 6.635 | 7.879 |
| 2 | 0.010 | 0.020 | 0.051 | 0.103 | 0.211 | 4.605 | 5.991 | 7.378 | 9.210 | 10.597 |
| 3 | 0.072 | 0.115 | 0.216 | 0.352 | 0.584 | 6.251 | 7.815 | 9.348 | 11.345 | 12.838 |
| 4 | 0.207 | 0.297 | 0.484 | 0.711 | 1.064 | 7.779 | 9.488 | 11.143 | 13.277 | 14.860 |
| 5 | 0.412 | 0.554 | 0.831 | 1.145 | 1.610 | 9.236 | 11.071 | 12.833 | 15.086 | 16.750 |
| 6 | 0.676 | 0.872 | 1.237 | 1.635 | 2.204 | 10.645 | 12.592 | 14.449 | 16.812 | 18.548 |
| 7 | 0.989 | 1.239 | 1.690 | 2.167 | 2.833 | 12.017 | 14.067 | 16.013 | 18.475 | 20.278 |
| 8 | 1.344 | 1.646 | 2.180 | 2.733 | 3.490 | 13.362 | 15.507 | 17.535 | 20.090 | 21.955 |
| 9 | 1.735 | 2.088 | 2.700 | 3.325 | 4.168 | 14.684 | 16.919 | 19.023 | 21.666 | 23.589 |
| 10 | 2.156 | 2.558 | 3.247 | 3.940 | 4.865 | 15.987 | 18.307 | 20.483 | 23.209 | 25.188 |
| 11 | 2.603 | 3.053 | 3.816 | 4.575 | 5.578 | 17.275 | 19.675 | 21.920 | 24.725 | 26.757 |
| 12 | 3.074 | 3.571 | 4.404 | 5.226 | 6.304 | 18.549 | 21.026 | 23.337 | 26.217 | 28.299 |
| 13 | 3.565 | 4.107 | 5.009 | 5.892 | 7.042 | 19.812 | 22.362 | 24.736 | 27.688 | 29.819 |
| 14 | 4.075 | 4.660 | 5.629 | 6.571 | 7.790 | 21.064 | 23.685 | 26.119 | 29.141 | 31.319 |
| 15 | 4.601 | 5.229 | 6.262 | 7.261 | 8.547 | 22.307 | 24.996 | 27.488 | 30.578 | 32.801 |
| 16 | 5.142 | 5.812 | 6.908 | 7.962 | 9.312 | 23.542 | 26.296 | 28.845 | 32.000 | 34.267 |
| 17 | 5.697 | 6.408 | 7.564 | 8.672 | 10.085 | 24.769 | 27.587 | 30.191 | 33.409 | 35.718 |
| 18 | 6.265 | 7.015 | 8.231 | 9.390 | 10.865 | 25.989 | 28.869 | 31.526 | 34.805 | 37.156 |
| 19 | 6.844 | 7.633 | 8.907 | 10.117 | 11.651 | 27.204 | 30.144 | 32.852 | 36.191 | 38.582 |
| 20 | 7.434 | 8.260 | 9.591 | 10.851 | 12.443 | 28.412 | 31.410 | 34.170 | 37.566 | 39.997 |
| 21 | 8.034 | 8.897 | 10.283 | 11.591 | 13.240 | 29.615 | 32.671 | 35.479 | 38.932 | 41.401 |
| 22 | 8.643 | 9.542 | 10.982 | 12.338 | 14.042 | 30.813 | 33.924 | 36.781 | 40.289 | 42.796 |
| 23 | 9.262 | 10.196 | 11.689 | 13.091 | 14.848 | 32.007 | 35.172 | 38.076 | 41.638 | 44.181 |
| 24 | 9.886 | 10.856 | 12.401 | 13.848 | 15.659 | 33.196 | 36.415 | 39.364 | 42.980 | 45.559 |
| 25 | 10.520 | 11.524 | 13.120 | 14.611 | 16.473 | 34.382 | 37.652 | 40.646 | 44.314 | 46.928 |
| 26 | 11.160 | 12.198 | 13.844 | 15.379 | 17.292 | 35.563 | 38.885 | 41.923 | 45.642 | 48.290 |
| 27 | 11.808 | 12.879 | 14.573 | 16.151 | 18.114 | 36.741 | 40.113 | 43.194 | 46.963 | 49.645 |
| 28 | 12.461 | 13.565 | 15.308 | 16.928 | 18.939 | 37.916 | 41.337 | 44.461 | 48.278 | 50.993 |
| 29 | 13.121 | 14.257 | 16.047 | 17.708 | 19.768 | 39.087 | 42.557 | 45.722 | 49.588 | 52.336 |
| 30 | 13.787 | 14.954 | 16.791 | 18.493 | 20.599 | 40.256 | 43.773 | 46.979 | 50.892 | 53.672 |
| 40 | 20.707 | 22.164 | 24.433 | 26.509 | 29.051 | 51.805 | 55.758 | 59.342 | 63.691 | 66.766 |
| 50 | 27.991 | 29.707 | 32.357 | 34.764 | 37.689 | 63.167 | 67.505 | 71.420 | 76.154 | 79.490 |
| 60 | 35.534 | 37.485 | 40.482 | 43.188 | 46.459 | 74.397 | 79.082 | 83.298 | 88.379 | 91.952 |
| 70 | 43.275 | 45.442 | 48.758 | 51.739 | 55.329 | 85.527 | 90.531 | 95.023 | 100.425 | 104.215 |
| 80 | 51.172 | 53.540 | 57.153 | 60.391 | 64.278 | 96.578 | 101.879 | 106.629 | 112.329 | 116.321 |
| 90 | 59.196 | 61.754 | 65.647 | 69.126 | 73.291 | 107.565 | 113.145 | 118.136 | 124.116 | 128.299 |
| 100 | 67.328 | 70.065 | 74.222 | 77.929 | 82.358 | 118.498 | 124.342 | 129.561 | 135.807 | 140.169 |

Source: Owen, *Handbook of Statistical Tables*, Table A-4 "Chi-Square Distribution Table," © 1962 by Addison-Wesley Publishing Company, Inc. Copyright renewal © 1990. Reproduced by permission of Pearson Education, Inc.





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Table H (continued)

F distribution

d.f.N.: degrees of freedom, numerator
 $\alpha = 0.05$

| d.f.D.: degrees of freedom, denominator | 1 | 2 | 3 | 4 | 5 | 6 | 8 | 9 | 10 | 12 | 15 | 20 | 24 | 30 | 40 | 60 | 120 | ∞ | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----------|-------|
| 1 | 161.4 | 199.5 | 215.7 | 224.6 | 230.2 | 234.0 | 236.8 | 238.9 | 240.5 | 241.9 | 243.9 | 245.9 | 248.0 | 249.1 | 250.1 | 251.1 | 252.2 | 253.3 | 254.3 |
| 2 | 18.51 | 19.00 | 19.16 | 19.25 | 19.30 | 19.33 | 19.35 | 19.37 | 19.38 | 19.40 | 19.41 | 19.43 | 19.45 | 19.46 | 19.47 | 19.48 | 19.48 | 19.49 | 19.50 |
| 3 | 10.13 | 9.55 | 9.28 | 9.12 | 9.01 | 8.94 | 8.89 | 8.85 | 8.81 | 8.79 | 8.74 | 8.70 | 8.66 | 8.64 | 8.59 | 8.57 | 8.57 | 8.55 | 8.53 |
| 4 | 7.71 | 6.94 | 6.59 | 6.39 | 6.26 | 6.16 | 6.09 | 6.04 | 6.00 | 5.96 | 5.91 | 5.86 | 5.80 | 5.77 | 5.72 | 5.69 | 5.66 | 5.63 | 5.63 |
| 5 | 6.61 | 5.79 | 5.41 | 5.19 | 5.05 | 4.95 | 4.88 | 4.82 | 4.77 | 4.74 | 4.68 | 4.62 | 4.56 | 4.53 | 4.46 | 4.43 | 4.40 | 4.36 | 4.36 |
| 6 | 5.99 | 5.14 | 4.76 | 4.53 | 4.39 | 4.28 | 4.21 | 4.15 | 4.10 | 4.06 | 4.00 | 3.94 | 3.87 | 3.84 | 3.77 | 3.74 | 3.70 | 3.67 | 3.67 |
| 7 | 5.59 | 4.74 | 4.35 | 4.12 | 3.97 | 3.87 | 3.79 | 3.73 | 3.68 | 3.64 | 3.57 | 3.51 | 3.44 | 3.41 | 3.34 | 3.30 | 3.27 | 3.23 | 3.23 |
| 8 | 5.32 | 4.46 | 4.07 | 3.84 | 3.69 | 3.58 | 3.50 | 3.44 | 3.39 | 3.35 | 3.28 | 3.22 | 3.15 | 3.12 | 3.04 | 3.01 | 2.97 | 2.93 | 2.93 |
| 9 | 5.12 | 4.26 | 3.86 | 3.63 | 3.48 | 3.37 | 3.29 | 3.23 | 3.18 | 3.14 | 3.07 | 3.01 | 2.94 | 2.90 | 2.83 | 2.79 | 2.75 | 2.71 | 2.71 |
| 10 | 4.96 | 4.10 | 3.71 | 3.48 | 3.33 | 3.22 | 3.14 | 3.07 | 3.02 | 2.98 | 2.91 | 2.85 | 2.77 | 2.74 | 2.66 | 2.62 | 2.58 | 2.54 | 2.54 |
| 11 | 4.84 | 3.98 | 3.59 | 3.36 | 3.20 | 3.09 | 3.01 | 2.95 | 2.90 | 2.85 | 2.79 | 2.72 | 2.65 | 2.61 | 2.53 | 2.49 | 2.45 | 2.40 | 2.40 |
| 12 | 4.75 | 3.89 | 3.49 | 3.26 | 3.11 | 3.00 | 2.91 | 2.85 | 2.80 | 2.75 | 2.69 | 2.62 | 2.54 | 2.51 | 2.43 | 2.38 | 2.34 | 2.30 | 2.30 |
| 13 | 4.67 | 3.81 | 3.41 | 3.18 | 3.03 | 2.92 | 2.83 | 2.77 | 2.71 | 2.67 | 2.60 | 2.53 | 2.46 | 2.42 | 2.34 | 2.30 | 2.25 | 2.21 | 2.21 |
| 14 | 4.60 | 3.74 | 3.34 | 3.11 | 2.96 | 2.85 | 2.76 | 2.70 | 2.65 | 2.60 | 2.53 | 2.46 | 2.39 | 2.35 | 2.27 | 2.22 | 2.18 | 2.13 | 2.13 |
| 15 | 4.54 | 3.68 | 3.29 | 3.06 | 2.90 | 2.79 | 2.71 | 2.64 | 2.59 | 2.54 | 2.48 | 2.40 | 2.33 | 2.29 | 2.20 | 2.16 | 2.11 | 2.07 | 2.07 |
| 16 | 4.49 | 3.63 | 3.24 | 3.01 | 2.85 | 2.74 | 2.66 | 2.59 | 2.54 | 2.49 | 2.42 | 2.35 | 2.28 | 2.24 | 2.15 | 2.11 | 2.06 | 2.01 | 2.01 |
| 17 | 4.45 | 3.59 | 3.20 | 2.96 | 2.81 | 2.70 | 2.61 | 2.55 | 2.49 | 2.45 | 2.38 | 2.31 | 2.23 | 2.19 | 2.10 | 2.06 | 2.01 | 1.96 | 1.96 |
| 18 | 4.41 | 3.55 | 3.16 | 2.93 | 2.77 | 2.66 | 2.58 | 2.51 | 2.46 | 2.41 | 2.34 | 2.27 | 2.19 | 2.15 | 2.06 | 2.02 | 1.97 | 1.92 | 1.92 |
| 19 | 4.38 | 3.52 | 3.13 | 2.90 | 2.74 | 2.63 | 2.54 | 2.48 | 2.42 | 2.38 | 2.31 | 2.23 | 2.16 | 2.11 | 2.02 | 1.98 | 1.93 | 1.88 | 1.88 |
| 20 | 4.35 | 3.49 | 3.10 | 2.87 | 2.71 | 2.60 | 2.51 | 2.45 | 2.39 | 2.35 | 2.28 | 2.20 | 2.12 | 2.08 | 2.00 | 1.95 | 1.90 | 1.84 | 1.84 |
| 21 | 4.32 | 3.47 | 3.07 | 2.84 | 2.68 | 2.57 | 2.49 | 2.42 | 2.37 | 2.32 | 2.25 | 2.18 | 2.10 | 2.05 | 1.96 | 1.92 | 1.87 | 1.81 | 1.81 |
| 22 | 4.30 | 3.44 | 3.05 | 2.82 | 2.66 | 2.55 | 2.46 | 2.40 | 2.34 | 2.30 | 2.23 | 2.15 | 2.07 | 2.03 | 1.94 | 1.89 | 1.84 | 1.78 | 1.78 |
| 23 | 4.28 | 3.42 | 3.03 | 2.80 | 2.64 | 2.53 | 2.44 | 2.37 | 2.32 | 2.27 | 2.20 | 2.13 | 2.05 | 2.01 | 1.91 | 1.86 | 1.81 | 1.76 | 1.76 |
| 24 | 4.26 | 3.40 | 3.01 | 2.78 | 2.62 | 2.51 | 2.42 | 2.36 | 2.30 | 2.25 | 2.18 | 2.11 | 2.03 | 1.98 | 1.89 | 1.84 | 1.79 | 1.73 | 1.73 |
| 25 | 4.24 | 3.39 | 2.99 | 2.76 | 2.60 | 2.49 | 2.40 | 2.34 | 2.28 | 2.24 | 2.16 | 2.09 | 2.01 | 1.96 | 1.87 | 1.82 | 1.77 | 1.71 | 1.71 |
| 26 | 4.23 | 3.37 | 2.98 | 2.74 | 2.59 | 2.47 | 2.39 | 2.32 | 2.27 | 2.22 | 2.15 | 2.07 | 1.99 | 1.95 | 1.85 | 1.80 | 1.75 | 1.69 | 1.69 |
| 27 | 4.21 | 3.35 | 2.96 | 2.73 | 2.57 | 2.46 | 2.37 | 2.31 | 2.25 | 2.20 | 2.13 | 2.06 | 1.97 | 1.93 | 1.84 | 1.79 | 1.73 | 1.67 | 1.67 |
| 28 | 4.20 | 3.34 | 2.95 | 2.71 | 2.56 | 2.45 | 2.36 | 2.29 | 2.24 | 2.19 | 2.12 | 2.04 | 1.96 | 1.91 | 1.82 | 1.77 | 1.71 | 1.65 | 1.65 |
| 29 | 4.18 | 3.33 | 2.93 | 2.70 | 2.55 | 2.43 | 2.35 | 2.28 | 2.22 | 2.18 | 2.10 | 2.03 | 1.94 | 1.90 | 1.81 | 1.75 | 1.70 | 1.64 | 1.64 |
| 30 | 4.17 | 3.32 | 2.92 | 2.69 | 2.53 | 2.42 | 2.33 | 2.27 | 2.21 | 2.16 | 2.09 | 2.01 | 1.93 | 1.89 | 1.79 | 1.74 | 1.68 | 1.62 | 1.62 |
| 40 | 4.08 | 3.23 | 2.84 | 2.61 | 2.45 | 2.34 | 2.25 | 2.18 | 2.12 | 2.08 | 2.00 | 1.92 | 1.84 | 1.79 | 1.69 | 1.64 | 1.58 | 1.51 | 1.51 |
| 60 | 4.00 | 3.15 | 2.76 | 2.53 | 2.37 | 2.25 | 2.17 | 2.10 | 2.04 | 1.99 | 1.92 | 1.84 | 1.75 | 1.70 | 1.59 | 1.53 | 1.47 | 1.39 | 1.39 |
| 120 | 3.92 | 3.07 | 2.68 | 2.45 | 2.29 | 2.17 | 2.09 | 2.02 | 1.96 | 1.91 | 1.83 | 1.75 | 1.66 | 1.61 | 1.50 | 1.43 | 1.35 | 1.25 | 1.25 |
| ∞ | 3.84 | 3.00 | 2.60 | 2.37 | 2.21 | 2.10 | 2.01 | 1.94 | 1.88 | 1.83 | 1.75 | 1.67 | 1.57 | 1.52 | 1.39 | 1.32 | 1.22 | 1.00 | 1.00 |