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Under the Guidence of

Amit Katiyar

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COMPUTER

1. Which of the following is NOT a characteristic of the von Neumann architecture?
   (a) Stored program concept
   (b)Use of binary arithmetic
   (c)Parallel processing
   (d)Sequential execution
2. The fetch-execute cycle in a CPU consists of:
   (a)Fetching instruction, decoding, executing
   (b) Fetching data, processing data, storing data
   (c) Decoding, storing, and retrieving
   (d) Fetching, executing, and saving
3. Which of the following is a non-volatile memory?
   (a) RAM (b) Cache
   (c) ROM (d) Registers
4. The binary representation of the decimal number 25 is:
   (a)11000 (b)11001
   (c)11010 (d)11011
5. The ASCII code for the character 'A' is:
   (a) 65 (b) 97
   (c) 48 (d) 32
6. Which logic gate outputs true only if both inputs are true?
   (a) OR (b) AND
   (c) XOR (d) NOR
7. What is the purpose of a multiplexer ?
   (a) Convert binary to decimal
   (b) Select one input from multiple inputs
   (c) Store multiple values
   (d) perform arithmetic operations
8. In computer memory hierarchy, which memory type is the fastest ?
   (a) Hard disk (b) RAM
   (c) Cache (d) SSD
9. Which of the following programming languages is considered a low-level language?
   (a) Python (b)Assembly
   (c) C++ (d) Java
10. Which of the following is NOT a system software?
    (a) Operating System (b) Compiler
    (c) MS Word (d) Linker
11. Which of the following number systems is base-8?
    (a) Decimal (b) Binary
    (c) Octal (d) Hexadecima
12. What is the decimal equivalent of the binary number 1010?
    (a) 8 (b) 9 (c) 10 (d) 11
13. What type of software is an interpreter?
    (a) System software
    (b) Application software
    (c) Utility software
    (d) Middleware
14. In C programming, which operator has the highest precedence?
    (a) + (b) *
    (c) / (d) (0)
15. What is the primary function of an operating system?
    (a) Manage hardware and software resources
    (b) Compile programs
    (c) Provide internet connectivity
    (d) Translate high-level code
16. What is the time complexity of binary search in a sorted array?
    (a) O(n) (b) O(log n)
    (c) (n log n) (d) O(1)
17. In which memory type does the data remain intact even after the power is switched off?
    (a) RAM (b) Cache
    (c)ROM (d) Registers
18. Which logic gate is used to perform the NOT operation on an input ?
    (a) OR (b) AND
    (c) XOR (d) NOR
19. Which of the following is true about machine language?
    (a) It is a high-level programming language
    (b) It is machine-dependent
    (c) It uses English keywords
    (d) It requires compilers to be executed
20. The C programming language uses which of the following data types to store real numbers?
    (a) int (b) float
    (c)char (d) double
21. What is the full form of BIOS?
    (a) Binary Input Operating System
    (b) Basic Integrated Operating Syste
    (c) Basic Input Output System
    (d) Binary Input Output System
22. Which of the following represents a character in the ASCII encoding scheme?
    (a) 01000001 (b) 00110011
    (c) 11001010 (d) 10101010
23. What is the primary difference between the compiler and the interpreter?
    (a) A compiler translates the entire program at once, while an interpreter translates one line at a time
    (b) A compiler translates one line at a time, while an interpreter translates the entire program at once
    (c) A compiler and an interpreter function in the same way
    (d) A compiler works only for low-level languages
24. What is the base number in OCTAL numbering system?
    (a) 0 (b) 2
    (c) 8 (d)10

25. Which of the following number systems uses base 16?
(a) Decimal (b) Binary
(c) Hexadecimal (d) Octal

26. What is the time complexity of a linear search in an unsorted array?
(a) (1) (b) O(n)
(c) O(log n) (d) O(n log n)

27. Which of the following is NOT a valid operator in C?
(a) + (b) &
(c) # (d) %

28. What is the main function of the Control Unit (CU) of the CPU?
(a) Perform arithmetic operations
(b) Manage memory access
(c) Fetch instructions and control the execution of instructions
(d) Perform input-output operations

29. The operator "&&" in C represents:
(a) Bitwise AND (b) Logical AND
(c) Bitwise OR (d) Logical OR

30. What does the acronym URL stand for?
(a) Uniform Resource Locator
(b) Uniform Resource Link
(c) Universal Resource Locator
(d) Universal Resource Link

31. Which of the following is NOT a valid C language function prototype?
(a) int sum(int a, int b);
(b) void display();
(c) int calculate();
(d) void main();

32. Which of the following is the smallest memory unit?
(a) Bit (b) Byte
(c) Word (d) Nibble

33. Which of the following logic gates produces true only when one input is true and the other is false?
(a) XOR (b) AND
(c) OR (d) NAND

34. In C programming, which function is used to open a file for reading?
(a) open() (b) read()
(c) fopen() (d) fileopen()

35. Which of the following is true about a stack data structure?
(a) It follows First In, First Out (FIFO) order
(b) It follows Last In, First Out (LIFO) order
(c) It is a linear data structure
(d) It is a type of queue

36. What does the acronym HTTP stand for?
(a) Hyper Text Transfer Protocol
(b) Hyper Text Transport Protocol
(c) Hyper Text Transition Protocol
(d) Hyper Text Technical Protocol

37. What is the full form of CPU?
(a) Central Processing Unit
(b) Central Program Unit
(c) Central Processor Unit
(d) Computer Processing Unit

38. Which of the following is a correct form of a function declaration in C?
(a) functionName(int a, int b);
(b) int functionName(int a, int b)
(c) function(int a, int b)
(d) int function(int a, int b);

39. Which of the following is an example of a secondary storage device?
(a) RAM (b) Cache
(c) SSD (d) Register

40. Which function is used to find the length of a string in C?
(a) length() (b) size()
(c) strlen() (d) strsize()

MATHS

41. What is the number of subsets of a set containing 5 elements?
(a)5 (b)10
(c)25 (d)32

42. If A={1,2,3} and B={4,5}. what is the number of elements in A×B ?
(a) 3 (b) 5
(c) 6 (d) 10

43. If $f(x) = x^2 + 3x - 4$, find f(-1).
(a) -2 (b) -6 (c) 0 (d) 2

44. The square root of -9 is:
3 (b)-3 (c)3i (d)-3i

45. The fundamental theorem of algebra states that:
(a) Every polynomial equation has a real Solution
(b) Every polynomial equation has at most one root
(c) Every polynomial equation has at least one complex root
(d) Every polynomial equation has infinite roots

46. The general term in the expansion of $(x + y)^n$ is :
(a) ${}^nC_r\, x^{(n-r)}y^r$ (b) ${}^nC_r\, x^r y^{(n-r)}$
(c) ${}^nC_r\, x^{(n-r+1)}y^r$ (d) None of these

47. How many was can 4 books be arranged on a shelf?
(a) 4 (c) 24
(c) 16 (d) 12

48. If two fair dice are rolled, what is the probability of getting a sum of 7?
(a) 1/6 (b)1/12
(c)1/36 (d)1/4

49. The sum of the first n natural numbers given by:
(a) $n(n-1)/2$ (b)n^2
(c) $(n-1)/2$ (d)$(n+1)n/2$

50. If the 5th term of an arithmetic progression is 20 and the common difference is 3, what is the first term?
(a) 5 (b) 8
(c) 10 (d) 7

51. The determinant of the identity matrix of order 3 is :
(a) 0 (b) 1
(c) 3 (d) -1

52. The function f(x) = |x| is:
(a) Differentiable everywhere
(b) Continous but not differentiable at x = 0
(c) Discontinuous
(d) None of these

53. The area under a curve between two points is given by:
(a) Integration (b) Differentiation
(c) Summation (d) None of these

54. The order of the differential equation $d^2y/dx^2 + 3dy/dx = 5$ is:
(a) 1 (b) 2
(c) 3 (c) 0

55. The degree of the differential equation $(d^2y/dx^2)^3 + dy/dx = 0$ is:
(a) 3 (b) 1
(c) 2 (d) 0

56. If A and B are independent events, then P(A ∩ B) is:
(a) P(A) + P(B) (b) P(A) − P(B)
(c) P(A) × P(B) (d) None of these

57. The probability of getting at least one head when tossing two fair coins is :
(a) 1/2 (b) 3/4
(c) 1/4 (d) 1/3

58. A random variable X follows a binomial disribution with parameters n = 5 and p = 0.3 . The expected value of X is:
(a) 1.5 (b) 2.5
(c) 3.0 (d) 4.5

59. If A and B are two square matrices of the same order, then $(A + B)^2 =$
(a) $A^2 + B^2$ (c) $A^2 + 2AB + B^2$
(c) $A^2 + AB + B^2$ (d) None of these

60. The inverse of a matrix exists if and only if its determinant is:
(a) 0 (b) 1
(c) Non-zero (d) None of these

61. The determinant of a diagonal matrix is :
(a) The product of its diagonal elements
(b) The sum of its diagonal elements
(c) Always 1
(d) Always 0

62. $\lim_{(x\to 0)} \frac{\sin x}{x}$ is:
(a) 0 (b) 1
(c) ∞ (d) Does not exist

63. A function is continuous at x = a if:
(a) f (a) is defined
(b) $\lim_{x\to a} f(x)$ exists
(c) $\lim_{x\to a} f(x) = f(a)$
(d) All of the above

64. The derivative of e^x is:
(a) e^x (b) $xe^{(x-1)}$
(c) log x (d) None of these

65. The second derivative of x^3 is:
(a) 6x (b) $3x^2$
(c) x^2 (d) None of these

66. If a function f(x) is increasing, then its derivative must be:
(a) Positive (b) Negative
(c) Zero (d) None of these

67. $\int e^x\, dx$ =?
(a) $e^x + C$ (b) xe^x
(c) In x (d) None of these

68. The integral of 1/x with respect to x is :
(a) x In x (b) In |x| + C
(c) e^x (d) None of these

69. The definite integral of x^2 from 0 to 2 is:
(a) 8/3 (b) 4
(c) 6 (d) None of these

70. The area under the curve $y = x^2$ from x = 0 to x = 1 is:
(a) 1/3 (b) 1/2
(c) 1 (d) 2/3

71. The solution of dy/dx = x is:
(a) $x^2/2 + C$ (b) $x^3/3 + C$
(c) $e^x + C$ (d) None of these

72. The sum of the roots of the quadratic equation $ax^2 + bx + c = 0$ is:
(a) -b/a (b) b/a
(c) c/a (d) None of these

73. The roots of the equation $x^2 - 4x + 4 = 0$ are:
(a) 2, 2 (b) −2, 2
(c) 4, -4 (d) None of these

74. If log a = 2 and log b = 3, then log(ab) is:
(a) 5 (b) 6
(c) 1 (d) None of these

75. The derivative of x^x is:
(a) $x^x(1 + In\ x)$ (b) $x^x(1 - In\ x)$
(c) $x^{(x-1)}$ (d) None of these

76. If A is an invertible matrix, then $A^{-1} \times A =$
(a) 1 (b) A
(c) A^2 (d) 0

77. The function $f(x) = x^3 - 3x$ is :
(a) Increasing anywhere
(b) Decreasing everywhere
(c) Increasing in some intervals, decreasing in others
(d) None of these

78. The integral of cos x dx is:
(a) $\sin x + C$ (b) $-\sin x + C$
(c) $e^x + C$ (d) None of these

79. The determinant of a singular matrix is:
(a) 0 (b) 1
(c) -1 (d) None of these

80. Order of the power set P(A) of a set A of order n =
(a) n (b) 2^n
(c) n^2 (d) None of these

REASONING

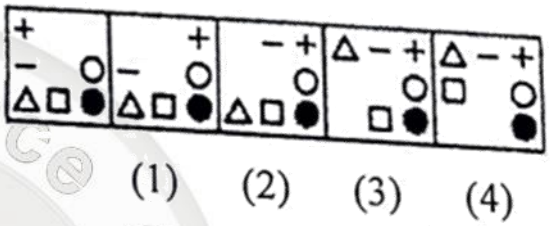
81. M has a son Q and a daughter R. He has no other child. E is mother of P and daughter in law of M. How is P is related to M?
(a) P is son in law of M
(b) P is grandchild of M.
(c) P is grandfather of M.
(d) P is daughter in law of M.

82. In a certain code language, "STUBBORN" is written as "VUTAAOSP". How is "SHIPPING" written in that code language?
(a) JITOOHOJ
(b) IJNNOJH
(c) JITOOHOJ
(d) QFOLLSLO

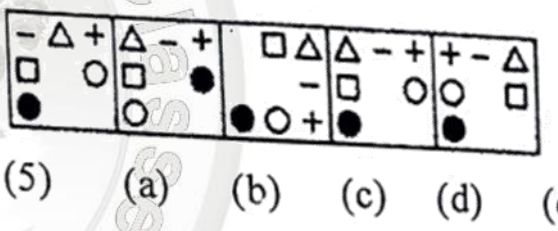
83. **The following question 83-84,** one statement is given and after that two conclusions are provided. You have to take the statements to be true though it shows difference from the known facts. At first, read the statements and then go to the conclusions. Among the conclusions, decide which is logically correct and answer the question by choosing the options provided.
Statements: Some kangaroos are chimpanzees. No chimpanzee is Dinosaur.
Conclusions:
1. All kangaroos are chimpanzees.
II. Some dinosaurs are kangaroos.
(a) Only conclusion 1 is correct.
(b) Only conclusion II is correct.
(c) Either 1 or II is correct.
(d) Neither 1 nor II is correct.
(e) Both I and II are correct.

84. **Statements:** All lovers are singers.
All film directors are lovers
Conclusions:
1. All film directors are singers.
11. Some lovers are film directors.
(a) Only conclusion I is correct.
(b) Only conclusion II is correct.
(c) Either I or Il is correct.
(d) Neither I nor II is correct.
(e) Both I and II are correct

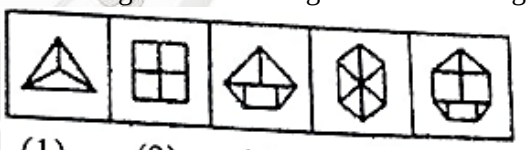
85. Select a figure from amongst the Answer Figures which will continue the same series as established by the five Problem Figures.



Answer Figures:

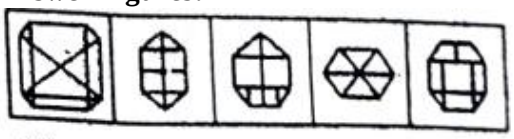


86. Select a figure from amongst the Answer Figures which



will continue the same series as established by the five Problem Figures.

Answer Figures:



87. Assuming all numbers are in 2's complement representation, which of the following numbers is divisible by 11111011?
(a) 11100111 (b) 11100100
(c) 11010111 (d) 11011011

88. Zero has two representations in:
(A) Sign magnitude (B) 1's complement
(C) 2's complement (D) None of the above
(a) Only A (b) A and B

(c) A and C (d) A, B and C

89. Let R be a relation on the set of ordered pairs of positive integers such that ((p, q), (r, s)) ∈ R if and only if p − s = q − r. Which one of the following is true about R?
(a) Both reflexive and symmetric
(b) Not reflexive but symmetric
(c) Reflexive but not symmetric
(d) Neither reflexive nor symmetric

90. Consider the following statements:
S1: There exists infinite sets A, B, C such that A ∪ C = B ∪ C is finite.
S2: There exists two irrational numbers x and y such that (x+y) is rational.
Which of the following is true about S1 and S2?
(a) Only S1 is correct
(b) Only S2 is correct
(c) Both S1 and S2 are correct
(d) None of S1 and S2 is correct

91. Which sentence is in the Active Voice?
(a) The cake was baked by Mary.
(b) John painted the fence yesterday.
(c) The book was read by her last night.
(d) The letter will be written by him tomorrow.

92. Identify the correct form of the verb in the sentence: "She _____ to the concert last night."
(a) gone (b) went
(c) go (d) goes

93. Which sentence is a not compound sentence?
(a) 1 like to swim, and I enjoy playing tennis.
(b) After the rain stopped, we went outside.
(c) She sang beautifully, but her voice cracked at the end.
(d) He worked hard, yet he failed to achieve his goal.

94. Choose the correct preposition to complete the sentence: "He is afraid_____ spiders".
(a) for (b) Of
(c) In (d) With

95. Identify the synonyms of "happy".
(a) Sad (b) Cheerful
(c) Angry (d) serious

96. Which sentence is in the Past Perfect tense?
(a) She will have finished her work by then.
(b) They had already left when I arrived.
(c) He is writing an email to his friend.
(d) The sun rises in the east.

97. Choose the correct conjunction to join these sentences: "She wanted to go out it was raining heavily."
(a) and (b) so
(c) but (d) because

98. Identify the correct homonym pair:
(a) accept, except (b) their, there
(c) to, too (d) brake, break

99. Which sentence is in the Present Perfect Continuous tense?
(a) They have lived in that house for five years.
(b) She has been waiting for the bus since morning.
(c) He will have completed his assignment by tomorrow.
(d) We went to the beach Jast weekend.

100. Identify the correct punctuation:
"I have a dog cat bird and fish."
(a) I have a dog, a cat, a bird, and a fish.
(b) I have a dog, cat, bird and fish.
(c) I have a dog, cat, bird and fish.
(d) None of these

ANSWER KEY

1	(c)	**2**	(a)	**3**	(c)	**4**	(b)	**5**	(a)
6	(b)	**7**	(b)	**8**	(c)	**9**	(b)	**10**	(c)
11	(c)	**12**	(c)	**13**	(a)	**14**	(d)	**15**	(a)
16	(b)	**17**	(c)	**18**	(d)	**19**	(b)	**20**	(b)
21	(c)	**22**	(a)	**23**	(a)	**24**	(c)	**25**	(c)
26	(b)	**27**	(c)	**28**	(c)	**29**	(b)	**30**	(a)
31	(d)	**32**	(a)	**33**	(a)	**34**	(c)	**35**	(b)
36	(a)	**37**	(a)	**38**	(d)	**39**	(c)	**40**	(c)

41.	**42.**	**43.**	**44.**	**45.**
(d)	(c)	(b)	(c)	(c)
46.	**47.**	**48.**	**49.**	**50.**
(a)	(c)	(a)	(d)	(b)
51.	**52.**	**53.**	**54.**	**55.**
(b)	(b)	(a)	(b)	(a)
56.	**57.**	**58.**	**59.**	**60.**
(c)	(b)	(a)	(d)	(c)
61.	**62.**	**63.**	**64.**	**65.**
(a)	(b)	(d)	(a)	(a)
66.	**67.**	**68.**	**69.**	**70.**
(a)	(a)	(b)	(a)	(a)
71.	**72.**	**73.**	**74.**	**75.**
(a)	(a)	(a)	(a)	(a)
76.	**77.**	**78.**	**79.**	**80.**
(a)	(c)	(a)	(a)	(b)
81.	**82.**	**83.**	**84.**	**85.**
(b)	(a)	(d)	(e)	(d)
86.	**87.**	**88.**	**89.**	**90.**
(a)	(a)	(b)	(b)	(b)
91.	**92.**	**93.**	**94.**	**95.**
(b)	(b)	(b)	(b)	(b)
96.	**97.**	**98.**	**99.**	**100.**
(b)	(c)	(a)	(b)	(a)

SOLUTION

41. **Solution**
n = 5
No of subset $=2^n = 2^5 = 32$

42. **Solution**
n((a) = 3
n((b) = 2
n(A × B) = (3 × 2) = 6

43. **Solution**
f(-1) $=(-1)^2 + 3(-1) - 4$
$= 1 - 3 - 4$
$= -6$

44. **Solution**
$\sqrt{(-9)} = \sqrt{9 \times (-1)} = 3i$ [we know $\sqrt{-1} = i$]

45. **Solution**
Every polynomial equation has at least one complex root

46. **Solution**
$T_{r+1} = {}^nC_r x^{n-r} y^r$

47. **Solution**
Shelf = 4
$4 \times 3 \times 2 = 24$

48. **Solution**
Total number of outcomes when two dice rolled $= 6 \times 6 = 36$
Possible outcomes of getting a sum of 7 is
$= (1,6), (2,5), (3,4), (4,3), (5,2), (6,1) = 6$
$P(\varepsilon) = \frac{6}{36} = \frac{1}{6}$

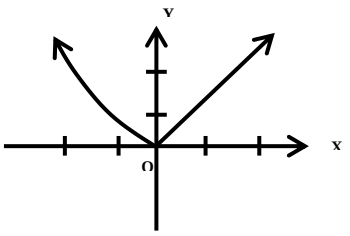
49. **Solution**
The sum of the first n natural numbers is
$= \frac{(n+1)n}{2}$

50. **Solution**
$T_5 = 20$
$d = 3$
$a = ?$
$T_n = a + (n-1)d$
$T_5 = a + (5-1)d$
$20 = a + 4 \times 3$
$a = 20 - 12$
$a = 8$

51. **Solution**
$[I]_{3\times3} = 1 \times 1 \times 1 = 1$

$$\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = 1(1-0) - 0 + 0 = 1$$

52. **Solution**



the given function is continuous but not differentiable at $x = 0$

$f(x) = |x| = \begin{cases} x & x \geq 0 \\ -x & x < 0 \end{cases}$

$L.H.L = \lim_{h \to 0}(-x) = \lim_{h \to 0} -(0-h) = 0$

$R.H.L\ f(0)^+$

$\log_{h\to0}(x) = \log_{h\to0}(0+h) = 0$

$f(0)^- = f(0)^+ = 0$

function is continuous at $x = 0$

for differentiability

$f'(0)^- = L.H.D \to \lim_{h \to 0} \frac{f(0-h) - f(0)}{-h}$

$\lim_{h \to 0} \frac{-(o-h) - (0)}{-h} = \lim_{h \to 0} \frac{h}{-h} = -1$

$f'(0)^+ = R.H.D \to \lim_{h \to 0} \frac{f(0+h) - f(0)}{h}$

$\lim_{h \to 0} \frac{(0+h) - (0)}{h} = \lim_{h \to 0} \frac{h}{h} = 1$

$[L.H.D \neq R.H.D]$

so the function is not differentiable at $x = 0$

53. **Solution**
By the fundamental theorem of calculus
$A = \int_a^b f(x)\,dx$

54. **Solution**
The order of the differential equation $\frac{d^2y}{dx^2} + \frac{3dy}{dx} = 5$ is
order $= 2$

55. **Solution**
The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + \frac{dy}{dx} = 0$ is
degree $= 3$

56. **Solution**
$P(A \cap B) = P(A).P(B)$

57. **Solution**
Total outcomes $= 2 \times 2 = 4$
Possible outcomes $= (H,T), (T,H), (H,H) = 3$
of at least one head $P(E) = \frac{3}{4}$

58. **Solution**

$x = mean = p \times n$
$= 0.3 \times 5 = 1.5$

59. **Solution**

$(A+B)^2 = A^2 + B^2 + AB + BA$

60. **Solution**

$|A| \neq 0$

61. **Solution**

The product of its diagonal elements

62. **Solution**

$\lim_{(x\to 0)} \frac{\sin x}{x} = 1$

63. **Solution**

f(a) is defined
$\lim_{(x\to a)} f(x) = exist = f(a)$

64. **Solution**

$\frac{d}{dx} e^x = e^x$

65. **Solution**

$\frac{d}{dx} x^3 = 3x^2$
again diff w. r. to $x \rightarrow$
$\frac{d^2}{dx^2}(x^3) = \frac{d}{dx} 3x^2 = 6x$

66. **Solution**

$f'(x) > 0 \rightarrow$ positive

67. **Solution**

$\int e^x dx = e^x + c.$

68. **Solution**

$\int \frac{1}{x} dx = log|x| + c$

69. **Solution**

$\int_0^2 x^2 dx = \left[\frac{x^3}{3}\right]_0^2 = \frac{8}{3}$

70. **Solution**

$A = \int_0^1 x^2\, dx = \left[\frac{x^3}{3}\right]_0^1 = \frac{1}{3}$

71. **Solution**

$\frac{dy}{dx} = x$ is

$dy = x\, dx$

Integrate $\rightarrow$

$\int dy = \int x\, dx$

$y = \frac{x^2}{2} + c$

72. **Solution**

$ax^2 + bx + c = 0$ is

Sum of the roots $= \frac{-b}{a}$

73. **Solution**

$x^2 - 2x - 2x + 4 = 0$

$(x-2)(x-2) = 0$

$x = 2, 2$

74. **Solution**

$\log(ab) = \log a + \log b$

$= 2 + 3 = 5$

75. $\frac{d}{dx} x^x = x^x(1 + \log x)$