

60. Which one of the following is equal to $\int (e^{2x} + \cos x) dx$?

A. $e^{2x} + \cos x + c$

B. $e^{2x} + \sin x + c$

C. $\frac{1}{2}e^{2x} + \sin x + c$

D. $\frac{1}{2}e^{2x} - \sin x + c$

61. Consider the sequence $\{a_n\}_{n=1}^{\infty}$, where $a_n = 1 + \frac{(-1)^n}{n}$ for $n \geq 1$. Which one of the following is true?

A. $a_{2n} = \frac{11}{19}$

B. $a_{2n} = \frac{12}{13}$

C. $a_n \leq a_{n+1}$ for all n

D. $a_n \geq a_{n+1}$ for all n

62. What is the simplified form of $\frac{\sqrt[3]{32}}{16^{\frac{1}{2}}}$?

A. $\frac{3}{8}$

B. $\frac{1}{8}$

C. $\frac{2}{3}$

D. $\frac{1}{2}$

Which one of the following numbers is equal to $\frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}}$?

A. $6 + 2\sqrt{2}$

B. $5 + 2\sqrt{6}$

C. $1 + 2\sqrt{3}$

D. $3 - 2\sqrt{3}$

86. Let $f(x) = 2\sqrt{x+1}$. Which one of the following indicates the interval and its derivative of f respectively?

A. $(-1, \infty), \frac{1}{\sqrt{x+1}}$

C. $(0, \infty), (x+1)^{\frac{3}{2}}$

B. $(-\infty, -1), (x+1)^{-\frac{1}{2}}$

D. $[-1, \infty), \frac{1}{\sqrt{x+1}}$

87. Let $f(x) = x^2 + \sqrt{x}$ and $g(x) = e^{2x}$. Which of the following is true?

A. $(f+g)'(x) = 2x + \frac{1}{2\sqrt{x}} + 2e^{2x}$

C. $(f+g)'(x) = 2x - \frac{1}{2}\sqrt{x} - 2e^{2x}$

B. $(f+g)'(x) = 2x + \frac{1}{2}\sqrt{x} + 2e^{2x}$

D. $(f+g)'(x) = 2x - \frac{1}{2\sqrt{x}} - 2e^{2x}$

88. What is the equation of the tangent line to the graph of the function $f(x) = e^x$ at $(1, e)$?

A. $y = ex + e$

C. $y = x + \frac{1}{e}$

B. $y = ex$

D. $y = \frac{1}{e}x + \frac{1}{e}$

89. Water is flowing into a cylindrical water tank of radius 2m and height 10m at a rate of 5π m³/min. What is the rate of the change of the height when the water level is 6m?

A. $\frac{5}{4\pi}$ m/min

C. 2 m/min

B. $\frac{5\pi}{4}$ m/min

D. 2π m/min

38. Let f be continuous on $[a, b]$ and $F'(x) = f(x)$ for all $x \in [a, b]$. Which of the following is true?

- A. $\int_a^b f(x) dx = F(a) - F(b)$ C. $\int_a^b f(x) dx = f(b) - f(a)$
 B. $\int_a^b f(x) dx = F(b) - F(a)$ D. $\int_a^b f(x) dx = f(a) - f(b)$

39. Which one of the following is equal to $\int_2^5 2x\sqrt{x^2+1} dx$?

- A. $\frac{4(5\sqrt{10} - 2\sqrt{2})}{3}$ C. $\frac{2(5\sqrt{10} + 2\sqrt{2})}{3}$
 B. $\frac{2(5\sqrt{10} - \sqrt{2})}{3}$ D. $\frac{4(5\sqrt{10} - \sqrt{2})}{3}$

40. A line makes an angle of 145° with the positive x-axis. What is the slope of the line? (Given $\sin 35^\circ = 0.7$)

- A. 0.7 C. $\frac{10}{7}$
 B. -0.7 D. $-\frac{10}{7}$

What is the solution set of $\frac{2}{x-1} + \frac{4}{x} = \frac{6}{x-2}$?

- A. $\left\{ \frac{4}{3} \right\}$ C. $\left\{ \frac{4}{5} \right\}$
 B. $\left\{ \frac{3}{4} \right\}$ D. $\left\{ \frac{5}{4} \right\}$

52. Which one of the following is equal to $\lim_{x \rightarrow 0} \frac{3}{\sqrt{x+1}-1}$?
- A. -1
B. $-\frac{1}{2}$
C. 0
D. -2
53. A couple own a house that values Birr 2,000,000. The house added Birr 10,000 in the first year, Birr 10,400 in the second year, Birr 10,800 in the third year and so on. What is the value of the house at the end of 6 years?
- A. Birr 2,012,000
B. Birr 2,054,000
C. Birr 2,060,000
D. Birr 2,064,000
54. Let f be a function defined on an open interval about a real number a , except possibly at a itself. Which one of the following is necessary for $\lim_{x \rightarrow a} f(x)$ to exist?
- A. $\lim_{x \rightarrow a^+} f(x)$ exists
B. $\lim_{x \rightarrow a^-} f(x)$ exists
C. $\lim_{x \rightarrow a^+} f(x) = \lim_{x \rightarrow a^-} f(x)$
D. $\lim_{x \rightarrow a^-} f(x) = f(a)$
55. Let f be a function that is continuous at x_0 . Which of the following is true about f ?
- A. x_0 does not belong to the domain of f
B. $\lim_{x \rightarrow x_0} f(x)$ does not exist
C. $\lim_{x \rightarrow x_0^-} f(x) \neq \lim_{x \rightarrow x_0^+} f(x)$
D. $\lim_{x \rightarrow x_0} f(x) = f(x_0)$

48. Let $z_1 = 2 - 3i$ and $z_2 = 5 + 7i$. Which one of the following is equal to $\frac{z_1}{z_2}$?

A. $-\frac{11}{74} - \frac{29}{74}i$

C. $-\frac{14}{46} + \frac{20}{46}i$

B. $\frac{31}{74} - \frac{29}{74}i$

D. $-\frac{11}{46} + \frac{10}{46}i$

49. What is the solution of the system of linear equations $\begin{cases} 2x + 7y = -5 \\ 5x + 11y = 2 \end{cases}$?

A. $x = -\frac{5}{3}$ and $y = \frac{25}{21}$

C. $x = \frac{69}{13}$ and $y = -\frac{29}{13}$

B. $x = \frac{5}{3}$ and $y = -\frac{25}{21}$

D. $x = -\frac{69}{13}$ and $y = \frac{29}{13}$

50. What is the area of an equilateral triangle inscribed in a circle of radius 4 units?

A. 12 sq. units

C. $6\sqrt{3}$ sq. units

B. 36 sq. units

D. $12\sqrt{3}$ sq. units

51. Consider the sequence $\left[1 + \frac{1}{n}\right]_{n=1}^{\infty}$. Which one of the following is true about the sequence?

A. 2 is its lower bound

C. 4 is its upper bound.

B. $\frac{3}{2}$ is its lower bound

D. $\frac{6}{5}$ is its upper bound

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C. 2 m/min

B. $\frac{5\pi}{4} \text{ m/min}$

D. $2\pi \text{ m/min}$

42. Let $l_1: y = \frac{1}{3}x + 1$ and $l_2: y = 2x - 1$ be two lines. What is the angle between l_1 and l_2 measured from l_1 to l_2 counter-clockwise?

A. $\frac{3\pi}{4}$

C. $\frac{\pi}{4}$

B. $\frac{3\pi}{2}$

D. $\frac{\pi}{2}$

43. Let p : 2 is a prime number and q : 3 is an odd number.

Then the contrapositive and its truth value of the statement $p \rightarrow q$ are respectively

A. $\neg q \rightarrow \neg p$ and True

C. $\neg p \rightarrow \neg q$ and True

B. $\neg q \rightarrow \neg p$ and False

D. $\neg p \rightarrow \neg q$ and False

44. The following table shows the test scores of 50 students in a class.

Test Score	Frequency
0 - 5	10
5 - 10	12
10 - 15	8
15 - 20	10
20 - 25	10

What is the variance of the population?

A. 18.45

B. 17

C. 20.25

D. 17.45

64. What is the solution set of the equation $6 - 4x - 2x^2 = 0$?
- A. $\{-3, 1\}$ C. $\{-6, 2\}$
B. $\{-1, 3\}$ D. $\{-2, 6\}$
65. Let $f(x) = x^2 - x$ and $g(x) = x + 1$. Which one of the following statements is true?
- A. $(f + g)(-2) = 3$ C. $(fg)(-2) = -5$
B. $(f - g)(-2) = 5$ D. $\left(\frac{f}{g}\right)(-2) = -6$

THE END

45. If two cards are drawn one after the other from a well shuffled pack of cards, then which one of the following is an independent event?
- A. Drawing a king in the first draw and a queen in the second draw without replacing the first.
 - B. Drawing a king in the first draw and a queen in the second draw by replacing the first.
 - C. Drawing kings in both draws without replacing the first.
 - D. Draw queens in both draws without replacing the first.

46. A bag contains 2 red, 3 white and 1 black balls. We draw two balls one after the other without replacement. What is the probability that the first ball is red and the second ball is black?

A. $\frac{1}{15}$

C. $\frac{1}{10}$

B. $\frac{1}{18}$

D. $\frac{1}{12}$

47. Let $A = \begin{pmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{pmatrix}$ and $\det(A) = 3$. Which one of the following is NOT true?

A. $\begin{vmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 3$

C. $\begin{vmatrix} -a_1 & b_1 & -c_1 \\ -a_2 & b_2 & -c_2 \\ -a_3 & b_3 & -c_3 \end{vmatrix} = 3$

B. $\begin{vmatrix} 2a_1 & 2b_1 & 2c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{vmatrix} = 6$

D. $\begin{vmatrix} a_1 & b_1 & b_1 \\ a_2 & b_2 & b_2 \\ a_3 & b_3 & b_3 \end{vmatrix} = -3$