

COLLEGE LEVEL MATHEMATICS

Suggested time – 50 minutes

35 Questions

Directions: In this section solve each problem. Then decide which is the best of the choices given.

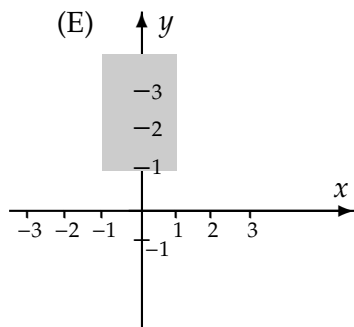
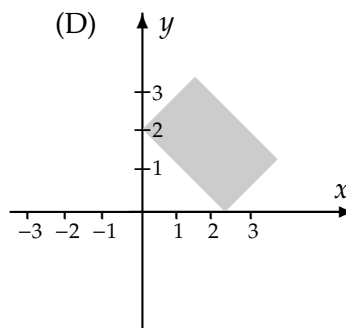
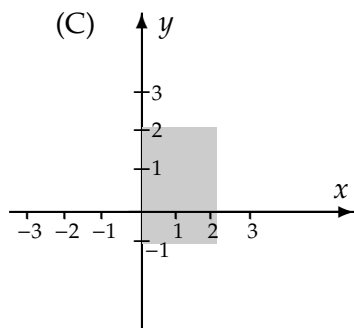
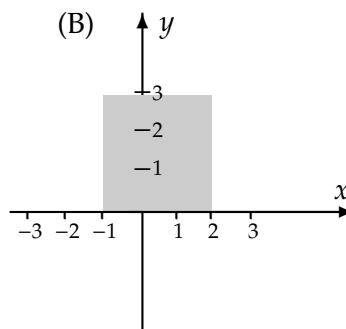
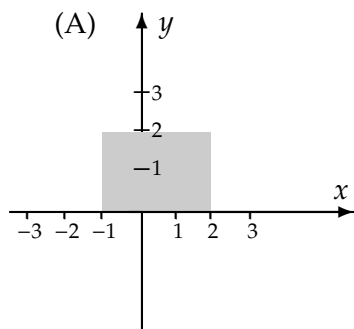
1. $2x^2 - 10x + 12 =$

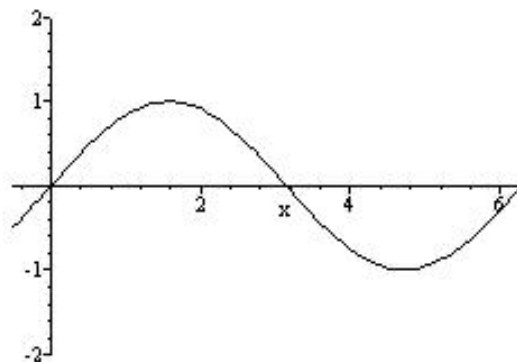
- (A) $(2x - 3)(x - 4)$ (B) $[2(x - 3)]^2$ (C) $2(x - 2)(x - 3)$ (D) $2(x + 6)(x - 1)$ (E) $2(x - 5)(x - 1)$

2. Where defined, $\frac{18x^3y^8z}{-6x^2y^4z} =$

- (A) $-3xy^4$ (B) $-3xy^2$ (C) $\frac{xy^4}{3}$ (D) $\frac{1}{3xy^2}$ (E) $\frac{y^4}{3x}$

3. Which of the following shaded regions is the graph of the region described by $-1 \leq x \leq 2$ and $0 \leq y \leq 3$?





4. The figure above is a portion of the graph of which of the following equations?

- (A) $y = \sin 2x$ (B) $y = 2 \cos x$ (C) $y = \sin x$ (D) $y = \csc x$ (E) $y = \tan x$

5. Which of the following can be factored in the form $(x + h)^2$, where h is an integer?

- (A) $x^2 + 3$ (B) $x^2 + 9$ (C) $x^2 + 6x + 12$ (D) $x^2 + 6x + 36$ (E) $x^2 + 6x + 9$

6. Where defined, $\left(\frac{x^2 + x - 6}{x + 3}\right)\left(\frac{x + 2}{x^2 - 4}\right) =$

- (A) 0 (B) 1 (C) $\frac{x-2}{x}$ (D) $\frac{x+1}{x+2}$ (E) $\frac{x+3}{x+2}$

7. Where defined, $\frac{1}{\tan \theta} =$

- (A) $\frac{\cos \theta}{\sin \theta}$ (B) $\frac{\sin \theta}{\cos \theta}$ (C) $\sec \theta$ (D) $\cos \theta$ (E) $\csc \theta$

8. If $4(x - 2) + 5 = 6 - (x + 5)$, then $x =$

- (A) $\frac{9}{4}$ (B) $\frac{14}{9}$ (C) $-\frac{14}{9}$ (D) $\frac{4}{5}$ (E) $-\frac{4}{9}$

9. For what values of x is $|2x + 5| = 15$?

- (A) -5 only (B) 8 only (C) -5 and 5 (D) -10 and 5 (E) -5 and 10

10. What is the sum of the roots of the equation $(x + 1)(x - 2)(x - 3) = 0$?

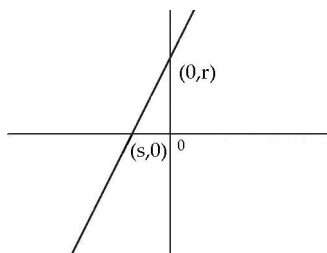
- (A) 6 (B) -4 (C) 5 (D) 4 (E) -6

11. If $x < 0$, then $2|x| + x =$

- (A) $-3x$ (B) $3x$ (C) x (D) $-x$ (E) $3|x|$

12. If $\sin 50^\circ = x$, then which one of the following is true?

- (A) $0 < x < \frac{1}{2}$
 (B) $\frac{1}{2} < x < \frac{\sqrt{2}}{2}$
 (C) $\frac{\sqrt{2}}{2} < x < \frac{\sqrt{3}}{2}$
 (D) $\frac{\sqrt{3}}{2} < x < 1$
 (E) $1 < x < \frac{3}{2}$



13. If the equation of the linear function in the figure is $y = mx + b$, then $m =$

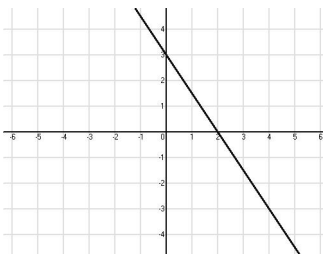
- (A) r (B) $-\frac{r}{s}$ (C) $\frac{r}{s}$ (D) $-\frac{s}{r}$ (E) $\frac{s}{r}$

14. If $a_2 = 2a_1 + 3$ and $a_3 = 4a_2 + 3^2$, then in terms of a_1 , $a_1 + a_2 + a_3 =$

- (A) $7a_1 + 27$ (B) $3a_1 + 27$ (C) $10a_1 + 63$ (D) $11a_1 + 63$ (E) $11a_1 + 24$

15. For what real numbers x is $x^2 - 14x + 49$ negative?

- (A) $-7 < x < 7$
 (B) $x < -7$ or $x > 7$
 (C) $x = -7$ or $x = 7$
 (D) $0 < x < 14$
 (E) For no x



16. An equation of the line in the figure above is

- (A) $y = -\frac{3}{2}x + 3$
 (B) $y = -\frac{2}{3}x$
 (C) $y = -\frac{2}{3}x + 2$
 (D) $y = \frac{2}{3}x + 2$
 (E) $y = \frac{3}{2}x + 3$

17. If $\log_5 x = 3$, then $x =$

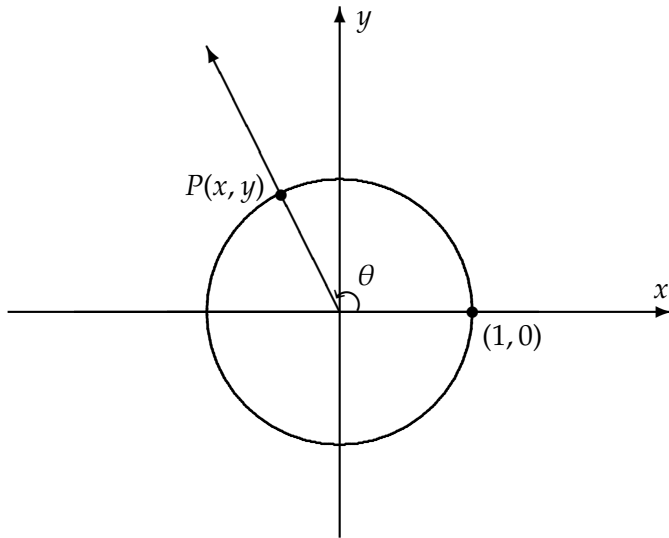
- (A) 3^5 (B) 5^3 (C) 15 (D) $\frac{5}{3}$ (E) $\frac{3}{5}$

18. What is the amplitude of $y = -5 \sin 4x$

- (A) 4 (B) $\frac{\pi}{4}$ (C) $\frac{5}{4}$ (D) -5 (E) 5

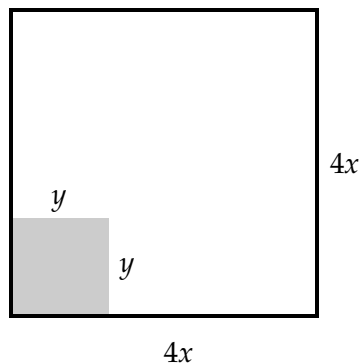
19. If $f(x) = 4x + 3$ and $g(x) = \frac{x-3}{4}$, then $f(g(x)) =$

- (A) x (B) $\frac{x-3}{8x+4}$ (C) $\frac{8x+2}{x-3}$ (D) $\frac{17x+9}{4}$ (E) $\frac{(4x+3)(x-3)}{4}$



20. In the figure above, if the coordinates of point P on the unit circle are (x, y) , then $\sin \theta =$

- (A) $\frac{x}{y}$ (B) $\frac{1}{y}$ (C) x (D) y (E) $\frac{1}{x}$



21. In the square in the figure above, the area of the unshaded region is

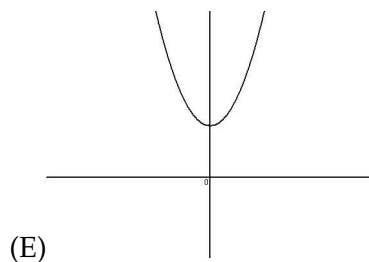
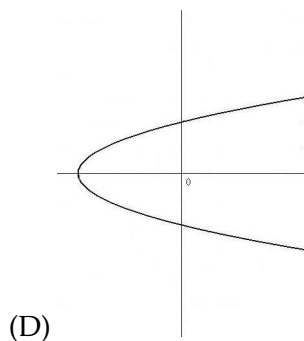
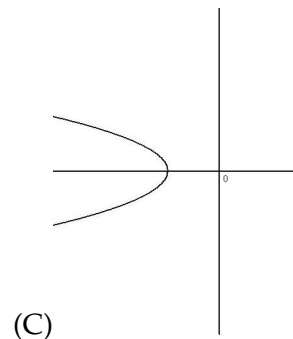
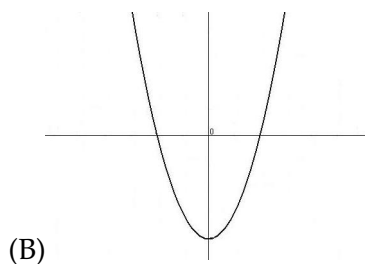
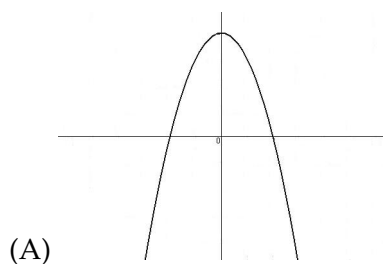
- (A) $(4x - y)(4x - y)$ (B) $16x^2 + y^2$ (C) $4x(4x - y) - y(4x + y)$ (D) $4x(4x + y) + y(4x + y)$ (E) $(4x + y)(4x - y)$

$$\begin{cases} y = -x + 2 \\ y = x^2 \end{cases}$$

22. What values of x satisfy the system of equations above?

- (A) 1 and -2 (B) 2 and -2 (C) 2 and -1 (D) 4 and 1 (E) 4 and 2

23. Which one of the following could represent the graph of $y = -x^2 + c$?



24. $\csc \frac{\pi}{3} =$

- (A) 2 (B) $\frac{\sqrt{3}}{2}$ (C) $\frac{2}{\sqrt{2}}$ (D) $\frac{2}{\sqrt{3}}$ (E) $\frac{\sqrt{2}}{2}$

25. If $f(x) = 3x^2 - 4$, then $f(-x) =$

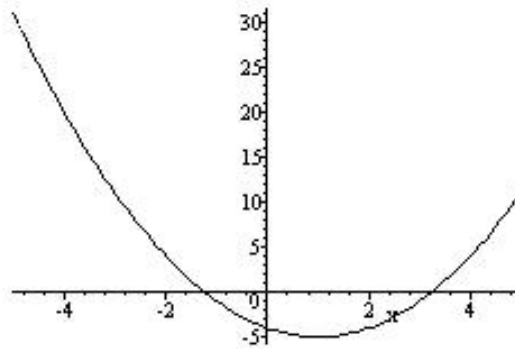
- (A) $f(x - 1)$ (B) $-f(x)$ (C) 0 (D) $f(x)$ (E) $f(x + 1)$

26. $\sum_{n=4}^{11} n =$

- (A) 7 (B) 10 (C) 60 (D) 66 (E) $\frac{11!}{4!}$

27. $8(2^{\frac{3}{2}})(4^{\frac{3}{4}}) =$

- (A) $2^{\frac{4}{9}}$ (B) 2^6 (C) $2^{\frac{27}{4}}$ (D) 2^7 (E) 2^9



28. Which of the following could be an equation of the graph shown in the figure above?

- (A) $y = (x - 1)^2 + 5$ (B) $y = (x - 1)^2 - 5$ (C) $y = (x + 1)^2 - 5$ (D) $y = |x - 1| - 5$ (E) $y = |x + 1| - 5$

29. $\log_5 \frac{\sqrt{5}}{5} =$

- (A) $-\frac{1}{\sqrt{5}}$ (B) $-\frac{1}{2}$ (C) $\frac{3}{2}$ (D) $\frac{1}{\sqrt{5}}$ (E) $\sqrt{5}$

30. If the domain D of the function f is the set of all real numbers x for which $f(x) = \sqrt{4 - x^2}$ is a real number, then $D =$

- (A) $\{x \mid x \leq -2 \text{ or } x \geq 2\}$ (B) $\{x \mid x < -2 \text{ or } x > 2\}$ (C) $\{x \mid -2 \leq x \leq 2\}$ (D) $\{x \mid x \neq 2\}$ (E) $\{x \mid -2 < x < 2\}$

31. $\frac{3 - 2i}{3 + 2i} =$

- (A) $1 - \frac{12}{7}i$ (B) $\frac{5}{7} - \frac{12}{7}i$ (C) $\frac{7}{13} - \frac{12}{13}i$ (D) $\frac{5}{13} - \frac{12}{13}i$ (E) $1 - i$

32. If $f(x) = \frac{1}{x}$, $x \neq 0$, then $\frac{f(x+h) - f(x)}{h}$ is

- (A) $\frac{h}{x(x+h)}$ (B) $\frac{-h}{x(x+h)}$ (C) 1 (D) $\frac{1}{x(x+h)}$ (E) $\frac{-1}{x(x+h)}$

33. What is the solution set $\cos x = \sqrt{3} \sin x$, where $0 \leq x \leq 2\pi$?

- (A) $\left\{\frac{\pi}{6}\right\}$ (B) $\left\{\frac{\pi}{3}\right\}$ (C) $\left\{\frac{\pi}{3}, \frac{4\pi}{3}\right\}$ (D) $\left\{\frac{\pi}{6}, \frac{7\pi}{6}\right\}$ (E) $\left\{\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}\right\}$

34. If $f(x) = 2 - 6x$, and f^{-1} denotes the inverse of f , then $f^{-1}(2) =$

- (A) -14 (B) -10 (C) 0 (D) 14 (E) undefined

35. If 3 is a double root of the equation $ax^3 + bx^2 + cx + d = 0$, which of the following could NOT be a factor of the left member of the equation?

- (A) $x^2 - 4x + 4$ (B) $x^2 - 5x + 6$ (C) $x^2 - 6x + 9$ (D) $x^2 + x - 12$ (E) $x^2 - 9$