CALCULUS READINESS TEST - 40 QUESTIONS -60 MINUTES

1. If $a = -3$, then $|a-1| - |3-2a| =$

(A) -5 (B) -1 (C) 1 (D) 5 (E) 13

2. $\left(\frac{26}{75x^4}\right)\left(\frac{3x^3}{52y}\right)(25y^2) =$

(A) $\frac{3x}{2y}$ (B) $\frac{y}{2x}$ (C) $\frac{3y}{2x}$ (D) $\frac{y^2}{2x}$ (E) $\frac{y}{6x}$

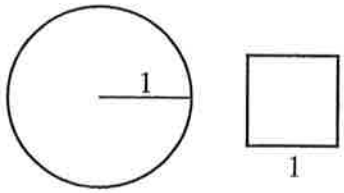
3. If $f(x) = 3x - 4$ and $g(x) = x^2 + 1$, then $f(g(2)) =$

(A) 2 (B) 5 (C) 7 (D) 10 (E) 11

4. If $a = 4$ and $b = -3$, then $\frac{a^2 - ab}{b^2 - ab} =$

(A) $-\frac{28}{3}$ (B) $-\frac{4}{3}$ (C) $\frac{3}{4}$ (D) $\frac{4}{3}$ (E) $\frac{16}{9}$

5. A circle with radius 1 and a square with side 1 are shown to the right. If C is the area of the circle and S is the area of the square, then which of the following is true?



(A) $C > 3S$ (B) $C < 3S$ (C) $C = 3S$

(D) $3C = S$ (E) $3C < S$

6. $\frac{x^{2a+3}}{x^{a-3}} =$

(A) x^6 (B) x^a (C) x^{3a} (D) x^{a-6} (E) x^{a+6}

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7. The inequality $3 - 2x < 5$ is equivalent to

(A) $x > -1$ (B) $x > -4$ (C) $x < 0$ (D) $x < -1$ (E) $x < -4$

8. $\left(\dfrac{2x^0y^{-2}}{z}\right)^{-3} =$

(A) 0 (B) $\dfrac{-8}{y^2z^3}$ (C) $\dfrac{z^3}{8x^3y^5}$ (D) $\dfrac{y^6z^3}{8}$ (E) $\dfrac{8y^6}{z^3}$

9. $\left(\dfrac{x+3}{x-3}\right)\left(\dfrac{x^2-9}{x^2+2x-3}\right) =$

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

10. The inequality $|x-3| < 4$ is equivalent to

(A) $-7 < x < 7$ (B) $-7 < x < 1$ (C) $-1 < x < 7$

(D) $2 < x < 4$ (E) $3 < x < 4$

11. What number must be added to $x^2 + 3x$ to form a perfect square?

(A) $\dfrac{3}{2}$ (B) $\dfrac{9}{4}$ (C) $\dfrac{9}{2}$ (D) 6 (E) 9

12. $\dfrac{x-1}{x^2-2x} + \dfrac{1}{2x-4} =$

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

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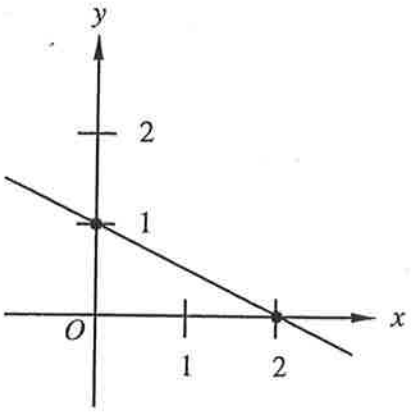
13. If $3 = 10^t$, then $t =$

(A) $\frac{10}{\sqrt{3}}$ (B) $\frac{3}{\sqrt{10}}$ (C) 10^3 (D) $\log_{10} 3$ (E) $\log_{10} \frac{1}{3}$

14. An equation of the line in the figure shown to the right is



(A) $\frac{1}{2}x + y = 1$ (B) $x + \frac{1}{2}y = 1$

(C) $x + y = 1$ (D) $x + 2y = 1$

(E) $2x + y = 1$

15. If $f(x) = \frac{6}{x-1}$, for what value of x does $f(x) = 5$?

(A) $\frac{1}{5}$ (B) $\frac{5}{11}$ (C) $\frac{7}{5}$ (D) $\frac{3}{2}$ (E) $\frac{11}{5}$

16. $x^{-1}(x^{-2} + x^{-3}) =$

(A) $\frac{1}{x^6}$ (B) $\frac{1}{x^7}$ (C) $\frac{1}{x^3 + x^4}$ (D) $\frac{1}{x^3} + \frac{1}{x^4}$ (E) $x^2 + x^3$

17. In the system of equations $\begin{cases} x - 3y = -1 \\ 2x + y = 12 \end{cases}$, $y =$

(A) -5 (B) -2 (C) 0 (D) 2 (E) 5

18. If $f(x) = x^2 - x + 1$, then $f(2a) =$

(A) $2a^2 - 2a + 1$ (B) $2a^2 - 2a + 2$ (C) $4a^2 - 2a + 1$

(D) $4a^2 - 2a - 1$ (E) $4a^2 + 2a + 1$

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19. When $2x^2 - 7x + 4$ is divided by $x - 3$ the remainder is

(A) -2 (B) -1 (C) 0 (D) 1 (E) 2

20. The length of an edge of a cube is x. What is the total surface area of the cube in terms of x?

(A) $4x^2$ (B) $6x^2$ (C) $8x^2$ (D) x^3 (E) $6x^3$

21. $\sin(\theta + 2\pi) =$

(A) $-\cos\theta$ (B) $-\sin\theta$ (C) $\sin 2\theta$ (D) $\cos\theta$ (E) $\sin\theta$

22. If the perimeter of a square is multiplied by 3, then its area is multiplied by

(A) $\frac{1}{9}$ (B) $\frac{1}{3}$ (C) 3 (D) 6 (E) 9

23. If $\frac{1}{2}$ is $\frac{3}{4}$ of $\frac{5}{6}$ of a certain number, then that number is

(A) $\frac{5}{4}$ (B) $\frac{4}{5}$ (C) $\frac{3}{4}$ (D) $\frac{3}{5}$ (E) $\frac{5}{16}$

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24. If $8^{2x+1} = 4^{1-x}$, then $x =$

(A) $-\frac{1}{8}$ (B) $-\frac{1}{5}$ (C) 0 (D) $\frac{1}{5}$ (E) $\frac{1}{8}$

25. If a and b are in the domain of a function f and $f(a) < f(b)$, which of the following must be true?

(A) $a = 0$ or $b = 0$ (B) $a < b$ (C) $a \leq b$ (D) $a \neq b$ (E) $a = b$

26. One of the roots of $x^2 + x - 3 = 0$ is

(A) $\frac{1+\sqrt{13}}{2}$ (B) $\frac{1-2\sqrt{3}}{2}$ (C) $\frac{-1+\sqrt{3}}{2}$

(D) $\frac{-1-2\sqrt{3}}{2}$ (E) $\frac{-1-\sqrt{13}}{2}$

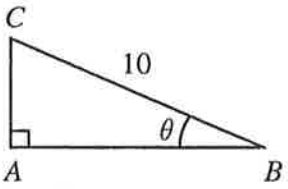
27. If $x \neq 2$ and $(x-2)^2(x+1) + 3(x-2)(x+1) = (x-2)P$, then $P =$

(A) $(x-2)(x+1)$ (B) $x^2 - 1$ (C) $(x+1)^2$ (D) $x^2 + 1$ (E) $x + 2$

28. From the information given in the table and in the figure shown to the right, which of the following best approximates the length of AB?

(A) 6.4 (B) 7.7 (C) 8.0

(D) 8.4 (E) 13.1



$\sin\theta$	$\cos\theta$	$\tan\theta$
.643	.766	.839

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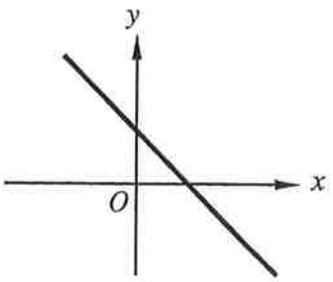
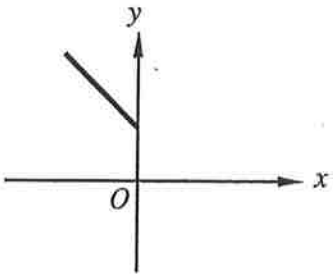
29. The graph of $y = f(x)$ is shown in the figure to the right. Which of the following is the graph of $y = |f(x)|$?



(A)



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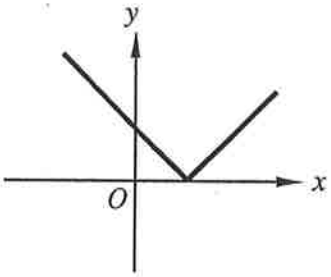

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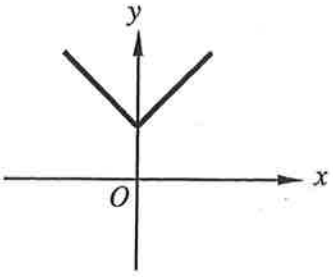
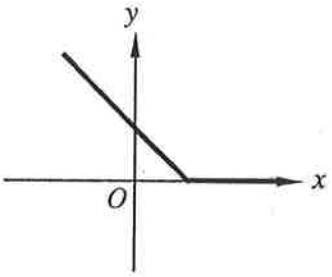
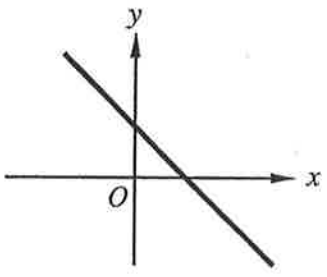


(D)



(E)



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30. $\log_2 64 =$

(A) $\frac{1}{6}$ (B) 6 (C) 8 (D) 32 (E) 128

31. From September 1991 to September 1994 the enrollment at a particular school declined by 20 percent. If the number of students enrolled at that school in September 1994 was 720, what was the enrollment in September 1991?

(A) 144 (B) 576 (C) 700 (D) 864 (E) 900

32. Cara ran 8 miles due north, then 4 miles due west, and finally 2 miles due south. What is the distance, in miles, from where Cara began her run to where she ended her run?

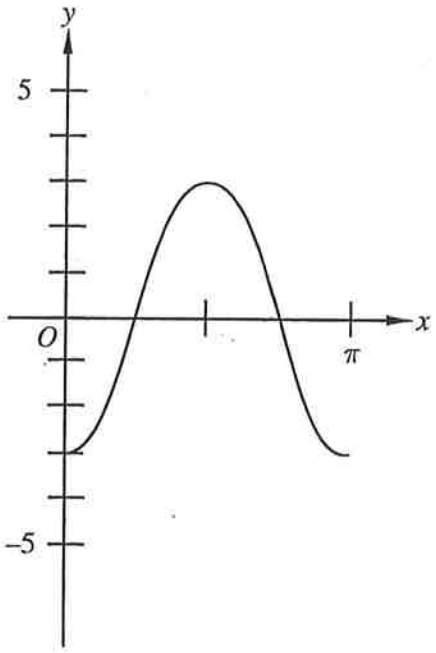
(A) $2\sqrt{5}$ (B) $4\sqrt{5}$ (C) $2\sqrt{10}$ (D) $2\sqrt{13}$ (E) 52

33. Which of the following could be an equation for the graph shown in the figure to the right?

(A) $y = 3\cos 2x$ (B) $y = 2\sin 3x$

(C) $y = -3\cos 2x$ (D) $y = -2\cos 3x$

(E) $y = -3\sin 2x$



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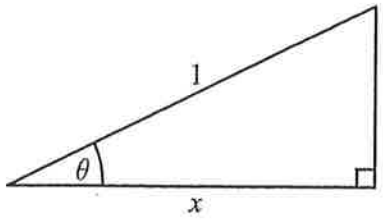
34. In the figure shown to the right, $\sin\theta =$



(A) $\sqrt{1-x^2}$ (B) $\sqrt{1+x^2}$ (C) $\dfrac{\sqrt{1-x^2}}{x}$

(D) $\dfrac{\sqrt{1+x^2}}{x}$ (E) x

35. $\sqrt{16x^6+4a^2x^4} =$

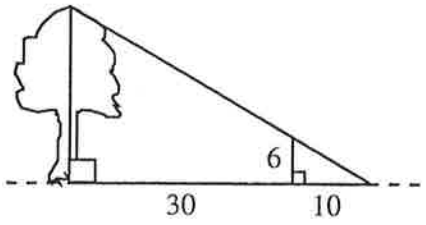
(A) $4x^3+2ax^2$ (B) $4x^4+2ax^2$ (C) $2x^2\sqrt{4x^2+a^2}$

(D) $2ax^2\sqrt{4x^2+1}$ (E) $4x^2\sqrt{4x^2+a^2}$

36. $\dfrac{\dfrac{d-c}{}}{\dfrac{c}{d}-\dfrac{d}{c}} =$

(A) $\dfrac{-1}{cd(c+d)}$ (B) $\dfrac{1}{cd(c+d)}$ (C) $\dfrac{-cd}{c-d}$ (D) $\dfrac{cd}{c-d}$ (E) $\dfrac{-cd}{c+d}$

37. In the figure shown to the right, what is the height of the tree?



(A) 18 (B) 24 (C) 26

(D) 36 (E) 50

38. If $\log w = \log x + \frac{1}{2}\log y$, then $w =$

(A) $\dfrac{xy}{2}$ (B) $(xy)^{1/2}$ (C) $(x+y)^{1/2}$ (D) $xy^{1/2}$ (E) $x+\frac{1}{2}y$

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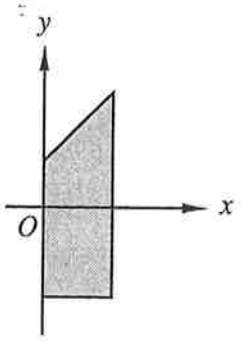
39. In which of the following intervals is $\sin x > \cos x$ for every value of x?

(A) $\left(0, \frac{\pi}{2}\right)$ (B) $(0, \pi)$ (C) $\left(\frac{\pi}{4}, \frac{5\pi}{4}\right)$ (D) $\left(\frac{\pi}{2}, \frac{3\pi}{2}\right)$ (E) $\left(\frac{5\pi}{4}, \frac{7\pi}{4}\right)$

40. The shaded region shown in the figure to the right is bounded by the y-axis and the lines $y = x + 2$, $y = -4$, and $x = 3$. What is the area of the shaded region?



(A) $\frac{27}{2}$ (B) $\frac{33}{2}$ (C) $\frac{39}{2}$

(D) $\frac{45}{2}$ (E) 27

END OF EXAMINATION