Practice Test 2

50 Questions (1 hour)

Directions: For each question, choose the BEST answer from the choices given. If the precise answer is not among the choices, choose the one that best approximates the answer. Then fill in the corresponding oval on the answer sheet.

Notes:

(1) To answer some of these questions, you will need a calculator. You must use at least a scientific calculator, but programmable and graphing calculators are also allowed.

(2) Make sure your calculator is in the correct mode (degree or radian) for the question being asked.

(3) Figures in this test are drawn as accurately as possible UNLESS it is stated in a specific question that the figure is not drawn to scale. All figures are assumed to lie in a plane unless otherwise specified.

(4) The domain of any function f is assumed to be the set of all real numbers x for which $f(x)$ is a real number, unless otherwise indicated.

Reference Information: Use the following formulas as needed.

Right circular cone: If r = radius and h = height, then Volume = $\frac{1}{3}\pi r^2 h$, and if c = circumference of the base and ℓ = slant height, then Lateral Area = $\frac{1}{2}c\ell$.

Sphere: If r = radius, then Volume = $\frac{4}{3}\pi r^3$ and Surface Area = $4\pi r^2$.

Pyramid: If B = area of the base and h = height, then Volume = $\frac{1}{3}Bh$.

1. If $y = \frac{x+y}{0.01} = 7$, then $\frac{1}{2x+2y} =$

(A) 0.14 (B) 0.28 (C) 3.50 (D) 7.00 (E) 7.14

2. $\frac{(100^{12})(10^4)}{10^2} =$

(A) 10^8 (B) 10^{14} (C) 10^{24} (D) 10^{26} (E) 10^{48}

3. If $\frac{x^2}{4} = \frac{6}{x}$, then $x =$

(A) 2.59 (B) 2.88 (C) 3.03 (D) 3.89 (E) 8.00

4. Which of the following is an equation of a line that will have points in all the quadrants except the first?

(A) $y = 2x$
(B) $y = 2x + 3$
(C) $y = 2x - 3$
(D) $y = -2x + 3$
(E) $y = -2x - 3$

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

(A) 3 (B) 1 (C) 0 (D) –1 (E) –3

6. If $f(x) = e^x + 2x$, then $f(\ln 2) =$

(A) 1.20
(B) 2.69
(C) 2.77
(D) 3.39
(E) 4.00

DO YOUR FIGURING HERE.

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7. In Figure 1, which of the following is the slope of line ℓ?

(A) -3

(B) -2

(C) $-\frac{1}{2}$

(D) $\frac{1}{2}$

(E) 2

DO YOUR FIGURING HERE.

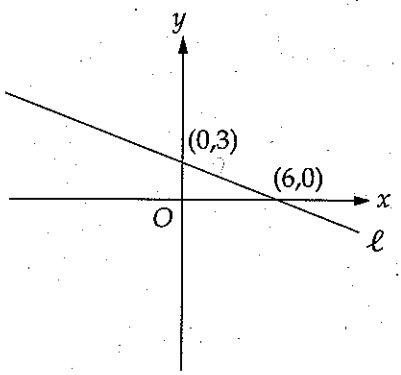

Figure 1

8. Which of the following is the complete solution set to the inequality $|x|+|x-3|>3$?

(A) $\{x : x > 3 \text{ or } x < 0\}$
(B) $\{x : -3 < x < 3\}$
(C) $\{x : -3 > x\}$
(D) $\{x : -3 < x\}$
(E) $\{x :$ The set of all real numbers$\}$

9. Which of the following is the solution set for $(3x-6)(2+x) < 0$?

(A) $\{x: x < 2\}$
(B) $\{x: x > 2\}$
(C) $\{x: x > -2\}$
(D) $\{x: x < -2 \text{ or } x > 2\}$
(E) $\{x: -2 < x < 2\}$

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10. If a line passes through the points (5,3) and (8,–1), at what point will this line intersect the y-axis?

(A) (0,8.33)
(B) (0,8.67)
(C) (0,9.00)
(D) (0,9.33)
(E) (0,9.67)

11. If $f(x) = 2x + 1$, and $f(x + 2) + f(x) = x$, the value of x is

(A) –2 (B) –1 (C) $-\frac{1}{2}$ (D) $\frac{1}{2}$ (E) 1

12. Set S is the set of all points (x,y) in the coordinate plane such that x and y are both integers with absolute value less than 4. If one of these points is chosen at random, what is the probability that this point will be 2 units or less from the origin?

(A) 0.189
(B) 0.227
(C) 0.265
(D) 0.314
(E) 0.356

DO YOUR FIGURING HERE.

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13. In Figure 2, what is the length of AC?

(A) 2.94
(B) 3.49
(C) 3.81
(D) 4.05
(E) 4.26

14. If $a = \sqrt[3]{t}$ and $b = t^2$, then $\frac{b}{a^5} =$

(A) $t^{\frac{1}{3}}$

(B) $t^{\frac{1}{3}}$

(C) $t^{\frac{5}{6}}$

(D) $t^{\frac{6}{5}}$

(E) $t^{\frac{10}{3}}$

15. If A, B, C, D, E, and F are 6 distinct points on the circumference of a circle, how many different chords can be drawn using any 2 of the 6 points?

(A) 6 (B) 12 (C) 15 (D) 30 (E) 36

DO YOUR FIGURING HERE.

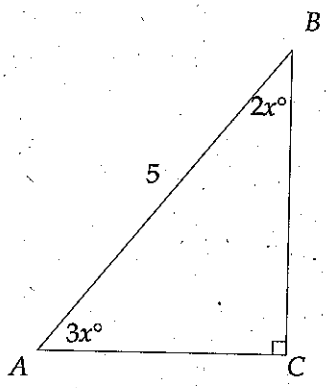

Figure 2

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16. A new computer can perform x calculations in y seconds and an older computer can perform r calculations in s minutes. If these two computers work simultaneously, how many calculations can be performed in t minutes?

(A) $t\left(\frac{x}{60y}+\frac{r}{s}\right)$

(B) $t\left(\frac{60x}{y}+\frac{r}{s}\right)$

(C) $t\left(\frac{x}{y}+\frac{r}{s}\right)$

(D) $t\left(\frac{x}{y}+\frac{60r}{s}\right)$

(E) $60t\left(\frac{x}{y}+\frac{r}{s}\right)$

17. Which of the following could be the equation of the parabola in Figure 3?

(A) $y = (x-2)(x-3)$
(B) $y = (x+2)(x+3)$
(C) $y = (x+2)(x-3)$
(D) $y = (x-2)(x+3)$
(E) $x = (y+2)(y-3)$

18. If $a+b=15$, $b+c=10$, and $a+c=13$, which of the following is true?

(A) $a<b<c$
(B) $b<a<c$
(C) $c<b<a$
(D) $a<c<b$
(E) $b<c<a$

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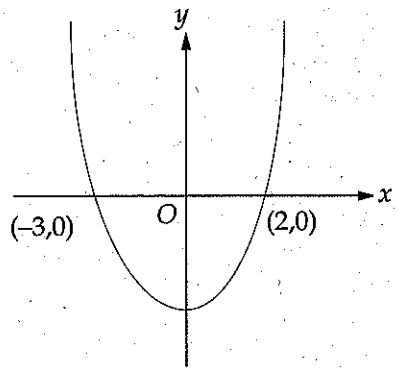

Figure 3

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19. In Figure 4, $\frac{1}{\sin\theta}+\frac{1}{\cos\theta}=$

(A) 0.75
(B) 1.20
(C) 1.43
(D) 2.74
(E) 2.92

20. Amanda goes to the toy store to buy 1 ball—either a football, basketball, or soccer ball—and 3 different board games. If the toy store is stocked with all types of balls but only 6 different types of board games, how many different selections of 4 items can Amanda make consisting of 1 type of ball and 3 different board games?

(A) 18 (B) 20 (C) 54 (D) 60 (E) 162

21. If point $P(3,2)$ is rotated 90 degrees counterclockwise with respect to the origin, what will be its new coordinates?

(A) (–2,3)
(B) (–2,–3)
(C) (–3,3)
(D) (–3,2)
(E) (–3,–2)

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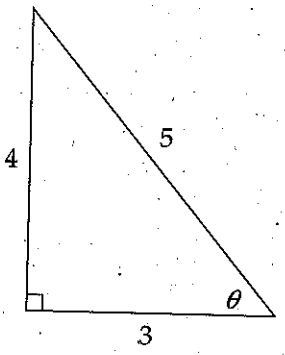

Figure 4

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22. If $0 < x < \frac{\pi}{2}$ and $\tan x = \frac{a}{2}$, then $\cos x =$

(A) $\frac{2}{\sqrt{a^2 - 4}}$

(B) $\frac{a}{\sqrt{a^2 - 4}}$

(C) $\frac{2}{a+2}$

(D) $\frac{2}{\sqrt{a^2 + 4}}$

(E) $\frac{a}{\sqrt{a^2 + 4}}$

23. For what value of x will $f(x) = (1 - 2x)^2$ have the minimum value?

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

24. If a certain line intersects the origin and is perpendicular to the line with the equation $y = 2x + 5$ at point P, what is the distance from the origin to point P?

(A) 2.24
(B) 2.45
(C) 2.67
(D) 3.25
(E) 3.89

DO YOUR FIGURING HERE.

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25. If the volume of a cube is equal to the volume of a sphere, what is the ratio of the edge of the cube to the radius of the sphere?

(A) 1.61
(B) 2.05
(C) 2.33
(D) 2.45
(E) 2.65

26. If $[x]$ represents the greatest integer less than or equal to x, what is the solution to the equation $1 - 2[x] = -3$?

(A) $x = 2$
(B) $2 \leq x < 3$
(C) $2 < x \leq 3$
(D) $2 < x < 3$
(E) There is no solution.

27. Which of the following lists all and only the vertical asymptotes of the graph $y = \frac{x}{x^2 - 4}$?

(A) $x = 2$ only
(B) $y = 2$ only
(C) $x = 2$ and $x = -2$
(D) $y = 2$ and $y = -2$
(E) $x = 2$, $x = -2$, and $x = 0$

28. If $\cos x \sin x = 0.22$, then $(\cos x - \sin x)^2 =$

(A) 0
(B) 0.11
(C) 0.44
(D) 0.56
(E) 1.00

DO YOUR FIGURING HERE.

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29. If water is poured at a rate of 12 cubic meters per second into a half-empty rectangular tank with length 5 meters, width 3 meters, and height 25 meters, then how high, in meters, will the water level be after 9 seconds?

(A) 6.0
(B) 7.2
(C) 18.5
(D) 19.7
(E) The tank will be full and overflowing.

30. A circle centered at (3,2) with radius 5 intersects the x-axis at which of the following x-coordinates?

(A) 2.39
(B) 4.58
(C) 7.58
(D) 8.00
(E) 8.39

31. If $0 \leq x \leq \pi$, where is $\frac{\tan x}{\sin x}$ defined?

(A) $0 \leq x \leq \pi$

(B) $0 < x < \pi$

(C) $0 < x < \frac{\pi}{2}$

(D) $\frac{\pi}{2} \leq x \leq \pi$

(E) $0 < x < \frac{\pi}{2}$ and $\frac{\pi}{2} < x < \pi$

DO YOUR FIGURING HERE.

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32. A rectangular box with an open top is constructed from cardboard to have a square base of area x^2 and height h. If the volume of this box is 50 cubic units, how many square units of cardboard, in terms of x, are needed to build this box?

(A) $5x^2$

(B) $6x^2$

(C) $\frac{200}{x}+x^2$

(D) $\frac{200}{x}+2x^2$

(E) $\frac{250}{x}+2x^2$

33. $\frac{(n+2)!-(n+1)!}{n!}=$

(A) $(n+2)!$
(B) $(n+1)!$
(C) $(n+2)^2$
(D) $(n+1)^2$
(E) n

DO YOUR FIGURING HERE.

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34. Bob wishes to borrow some money. He needs to defer to the following formula, where M is the monthly payment, r is the monthly decimal interest rate, P is the amount borrowed, and t is the number of months it will take to repay the loan:

$$M = \frac{rP}{1-\left(\frac{1}{1+r}\right)^t}$$

If Bob secures a loan of \$4,000 that he will pay back in 36 months with a monthly interest rate of 0.01, what is his monthly payment?

(A) \$111.11
(B) \$119.32
(C) \$132.86
(D) \$147.16
(E) \$175.89

35. A particle is moving along the line $5y = -6x + 30$ at a rate of 2 units per second. If the particle starts at the y-intercept and moves to the right along this line, how many seconds will it take for the particle to reach the x-axis?

(A) 2.50
(B) 3.25
(C) 3.76
(D) 3.91
(E) 7.81

DO YOUR FIGURING HERE.

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36. In Figure 5, if the area of triangle ABC is 15, what is the length of AC?

(A) 2.1
(B) 4.1
(C) 6.2
(D) 8.2
(E) 9.6

37. Which of the following functions has a range of $-1 < y < 1$?

(A) $y = \sin x$

(B) $y = \cos x$

(C) $y = \dfrac{x}{1+x}$

(D) $y = \dfrac{x^2}{1+x^2}$

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

38. What is the sum of the infinite series $1 - \frac{1}{3} + \frac{1}{9} - \frac{1}{27} + \ldots$?

(A) $\frac{2}{3}$ (B) $\frac{3}{4}$ (C) 1 (D) $\frac{4}{3}$ (E) $\frac{3}{2}$

DO YOUR FIGURING HERE.

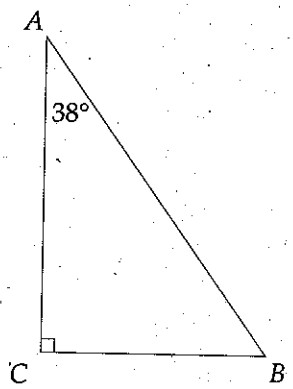

Figure 5

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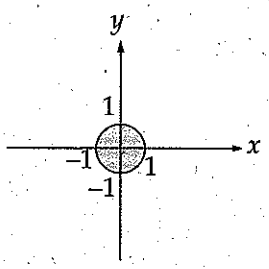
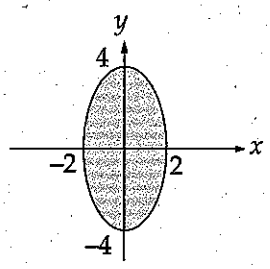
39. In Figure 6, the shaded region represents the set C of all points (x, y) such that $x^2 + y^2 \leq 1$. The transformation T maps the point (x, y) to the point $(2x, 4y)$. Which of the following shows the mapping of the set C by the transformation T?

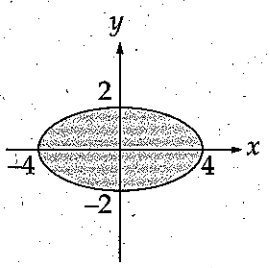
(A)



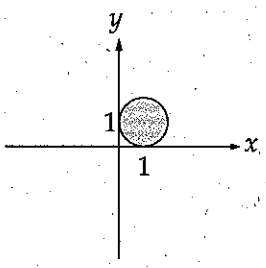
(B)



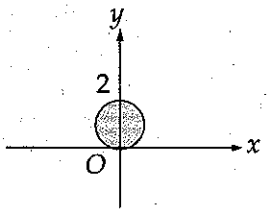
(C)



(D)



(E)



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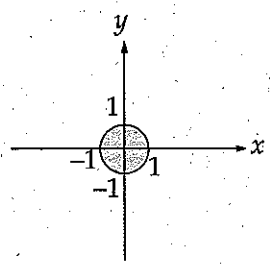

Figure 6

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40. $\lim_{n\to\infty} \frac{1-2n^2}{5n^2-n+100} =$

(A) -1

(B) $-\frac{2}{5}$

(C) $\frac{2}{5}$

(D) 1

(E) No limit exists.

41. If $\log_2(x^2-3) = 5$, which of the following could be the value of x?

(A) 3.61
(B) 4.70
(C) 5.29
(D) 5.75
(E) 5.92

42. If 2 is a zero of the function $f(x) = 6x^3 - 11x^2 - 3x + 2$, what are the other zeroes?

(A) $-\frac{1}{3}$ and $-\frac{1}{2}$

(B) $-\frac{1}{3}$ and $\frac{1}{2}$

(C) $\frac{1}{3}$ and $-\frac{1}{2}$

(D) $\frac{1}{3}$ and $\frac{1}{2}$

(E) 2 and 3

DO YOUR FIGURING HERE.

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43. In Figure 7, a circle of radius 1 is placed on an incline where point P, a point on the circle, has the coordinates (–5,–5). The circle is rolled up the incline, and once the circle hits the origin, the circle is then rolled horizontally along the x-axis to the right. What is the x-coordinate of the point where P touches the incline or the x-axis for the fifth time (not including the starting point)?

(A) 8.64
(B) 17.27
(C) 24.34
(D) 27.49
(E) 30.63

DO YOUR FIGURING HERE.

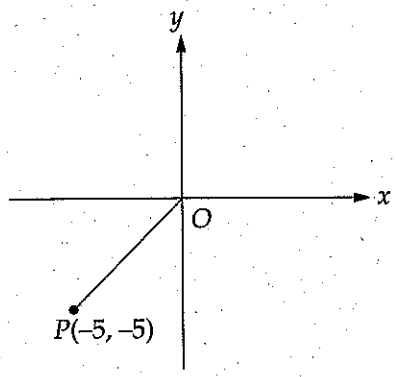

Figure 7

44. If $0 \leq x \leq 2\pi$ and $\sin x < 0$, which of the following must be true?

I. $\cos x < 0$

II. $\csc x < 0$

III. $|\sin x + \cos x| \geq 0$

(A) I only
(B) II only
(C) III only
(D) I and II
(E) II and III

45. If $i^2 = -1$, which of the following is a square root of $8 - 6i$?

(A) $3 - i$
(B) $3 + i$
(C) $3 - 4i$
(D) $4 - 3i$
(E) $4 + 3i$

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46. Figure 8 shows rectangle $ABCD$. Points A and D are on the parabola $y = 2x^2 - 8$, and points B and C are on the parabola $y = 9 - x^2$. If point B has coordinates (–1.50, 6.75), what is the area of rectangle $ABCD$?

(A) 12.50
(B) 17.50
(C) 22.75
(D) 26.50
(E) 30.75

47. If $x \geq 0$ and $\arcsin x = \arccos(2x)$, then $x =$

(A) 0.866
(B) 0.707
(C) 0.500
(D) 0.447
(E) 0.245

48. If $f(x) = \frac{1}{2}x - 4$ and $f(g(x)) = g(f(x))$, which of the following can be $g(x)$?

I. $2x - \frac{1}{4}$
II. $2x + 8$
III. $\frac{1}{2}x - 4$

(A) I only
(B) II only
(C) III only
(D) II and III only
(E) I, II, and III

DO YOUR FIGURING HERE.

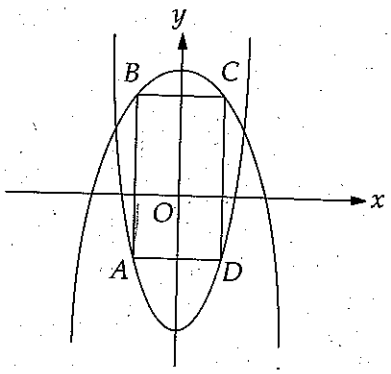

Figure 8

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49. If a right circular cylinder of height 10 is inscribed in a sphere of radius 6, what is the volume of the cylinder?

(A) 104 (B) 346 (C) 545 (D) 785 (E) 1,131

50. If the diagonals AC and BD intersect at point P in the cube in Figure 9, what is the degree measure of angle APB ?

(A) 60
(B) 65
(C) 71
(D) 83
(E) 90

DO YOUR FIGURING HERE.

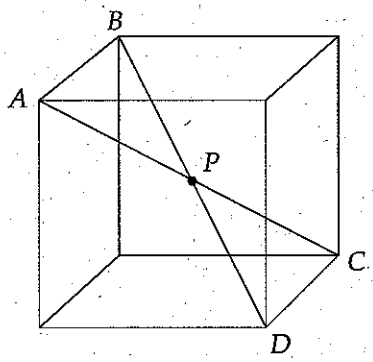

Figure 9

STOP!

If you finish before time is up, you may check your work.

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Turn the page
for answers and explanations
to Practice Test 2.

Answer Key
Practice Test 2

1. E
2. D
3. B
4. E
5. E
6. D
7. C
8. A
9. E
10. E
11. A
12. C
13. A
14. B
15. C
16. B
17. D
18. C
19. E
20. D
21. A
22. D
23. D
24. A
25. A
26. B
27. C
28. D
29. D
30. C
31. E
32. C
33. D
34. C
35. D
36. C
37. E
38. B
39. B
40. B
41. E
42. C
43. C
44. B
45. A
46. E
47. D
48. D
49. B
50. C