HONORS MATH ANALYSIS
ALGEBRA/GEOMETRY/TRIG REVIEW

1. The expression $6x - [3x - 2(x-5x)]$ is equal to:

   a) $-18x$ b) $-5x$ c) $2x$
   d) $10x$ e) $11x$

2. The expression $\dfrac{\frac{x}{3}}{1-\frac{x}{3}}$ is equal to:

   a) $\dfrac{x}{3-x}$ b) $\dfrac{3x}{2}$ c) $\dfrac{x+3}{x}$
   d) $\dfrac{2x}{3}$ e) $\dfrac{1}{2}$

3. The solution of $5 - 2(1 - x) = 1 - 2x$ is contained in the interval:

   a) $-2.5 < x < -1.5$ b) $-1.5 < x < 0$
   c) $0 < x < 1$ d) $1 < x < 2$
   e) $2 < x < 3$

4. The solution of the equation $\dfrac{x}{2} - \dfrac{x}{3} = 1$ is:

   a) $\dfrac{1}{5}$ b) $\dfrac{5}{6}$ c) $\dfrac{6}{5}$
   d) 5 e) 6

5. One factor of the expression $ab^3 - a^3b^2$ is:

   a) $a - b^2$ b) $b - a^2$ c) $b - a^3b^2$
   d) $b^2 - a^3b$ e) $b^2 - a^3b^2$

6. The numbers satisfying the inequality $8 - 2x > 16$ are:

   a) $x > -12$ b) $x < -12$ c) $x > -4$
   d) $x < -4$ e) $x < 4$

7. The expression $(2x-3)^2 + 2(x+3)$ is equal to:

   a) $4x^2 + 2x + 12$ b) $4x^2 + 2x + 15$
   c) $4x^2 - 10x + 15$ d) $4x^2 - 4x + 15$
   e) $4x^2 - 4x + 12$

8. The solutions of $3x^2 = x$ are:

   a) 0 or $\dfrac{1}{3}$ b) 0 or $\dfrac{1}{\sqrt{3}}$ c) $\pm\dfrac{1}{\sqrt{3}}$
   d) $\pm\dfrac{1}{3}$ e) $\dfrac{1}{3}$

9. If $V = P(1+rt)$, then t is equal to:

   a) $\dfrac{V}{rP} - 1$ b) $\dfrac{V-P}{r}$ c) $\dfrac{V-1}{rP}$
   d) $\dfrac{V-P}{rP}$ e) $\dfrac{V+P}{rP}$

10. If the product $(2x - y + 3)(3x + 5y + 4xy)$ is computed and simplified, the term containing xy in the result is:

    a) $-3xy$ b) $7xy$ c) $10xy$
    d) $12xy$ e) $19xy$

11. The treasurer of the church building fund reports that 30% of the contributions last month came from individuals, \$63 was received from a bake sale, and the remaining 40% came from the Ladies Guild. The amount x of money received last month by the building fund satisfies:

    a) $x < 150$ b) $150 \le x < 200$
    c) $200 \le x < 250$ d) $250 \le x < 300$
    e) $300 \le x$

12. The larger of the two solutions of $2x^2 - 6x - 8 = 0$ is:

a) -1 b) $\frac{1}{2}$ c) 1 d) 2 e) 4

13. The expression $\frac{ab^2}{c^2} \div \frac{cb}{a^3}$ simplifies to:

a) $\frac{b^3}{a}$ b) $\frac{b^3}{a^2c}$ c) $\frac{c^3}{a^4b}$

d) $\frac{a^4b^3}{c^3}$ e) $\frac{a^4b}{c^3}$

14. The expression $\frac{(x^2y)^3}{x^2y^4}$ is equal to:

a) $\frac{1}{y}$ b) $\frac{x^4}{y}$ c) $\frac{x^3}{y}$

d) x^4y e) $\frac{1}{y^3}$

15. When reduced to lowest terms, the expression $\frac{x^3+xy^2}{y^3+yx^2}$ is equal to:

a) $\frac{x}{y}$ b) 1 c) $\frac{x^3+1}{y^3+1}$

d) $\frac{x^3+y}{y^3+x}$ e) $\frac{x^2}{y^2}$

16. Solve the system of equations: $2x + 3y = 5$
$4x + y = -5$

The value of x is:

a) –3 b) –2 c) 2 d) 3 e) 4

17. Solve the inequality $x^2 + x < 6$. The result is:

a) $-3 < x < 2$ b) $-2 < x < 3$ c) $x < 2$

d) $x > 2$ or $x < -3$ e) $x < -3$ or $x > 2$

18. The expression $(x-5)(x^2+2x+1)$ is equal to:

a) x^3+3x^2-9x+5 b) x^3-3x^2-9x-5
c) $x^3+7x^2+11x+5$ d) x^3+2x^2+9x-5
e) $x^3-3x^2+11x+5$

19. For $x > 0$, $(\sqrt{50x} - \sqrt{2x})^2$ simplifies to:

a) 72x b) 42x c) 48x
d) 52x e) 32x

20. The solution of $3 = 2 - \frac{2x-13}{x-5}$ is:

a) -8 b) -6 c) $\frac{38}{7}$ d) 6 e) 8

21. The expression $\frac{x-1}{x} + \frac{1}{x^2+x}$ simplifies to:

a) $\frac{1}{x}$ b) $\frac{x}{x+1}$ c) $\frac{1}{x+1}$

d) $\frac{x+2}{x+1}$ e) $-\frac{1}{x}$

22. The expression $\sqrt[3]{27x^2}$ is equal to:

a) $\frac{1}{3x^{2/3}}$ b) $3x^{7/3}$ c) $27x^{2/3}$

d) $9x^{2/3}$ e) $3x^{2/3}$

23. One solution of $x^2 - 5x + 2 = 0$ is:

a) $\frac{5+\sqrt{17}}{2}$ b) $\frac{-5-\sqrt{21}}{2}$ c) $\frac{5+\sqrt{21}}{2}$

d) $\frac{5-\sqrt{33}}{2}$ e) $\frac{-5-\sqrt{33}}{2}$

24. If $25^{\frac{x}{2}} = 5$ and $3^{x+y} = 81$, then y is equal to:

a) 0 b) 1 c) 2 d) 3 e) 3.5

25. If $x = \frac{2}{3}$ is a solution of the equation $6x^2 - x + k = 0$, then the value of k is:

a) –2 b) –1 c) 0 d)1 e)2

26. If $f(x) = 2x^2 - 3x$, then $f(1+h)$ is equal to:

a) $2h^2 + 7h - 1$ b) $2h^2 + h - 1$
c) $2h^2 - 3h - 1$ d) $2h^2 + h + 5$
e) $2h^2 + 7h + 5$

27. The slope-intercept form of the equation of the line passing through (12, -8) and having slope 2 is:

a) $y = 2x - 32$ b) $y = 2x + 32$
c) $y = 2x - 8$ d) $y = -2x - 32$
e) $y = -2x + 32$

28. The points of intersection, if any, of the line $x + y = 2$ and the parabola $y^2 = x$ are:

a) (1, -1) and (4, -2) b) (1, 1) and (-4, 2)
c) (1, -1) and (-4, 2) d) (1, 1) and (4, -2)
e) They do not intersect.

29. Solve $|2x - 3| < 19$ for x. The result is:

a) $x < 1$ b) $-8 < x < 8$ c) $-8 < x < 11$
d) $-11 < x < 8$ e) $-11 < x < 11$

30. According to one plan for the exploration of Mars the round trip would take 3 years which includes staying on Mars for 449 Earth days. If one must travel a distance of 34,000,000 miles each way on the trip, which of the following expressions can be used to compute the average speed of travel in miles per hour?

a) $\frac{(3\times365-449)\times24}{2\times34{,}000{,}000}$

b) $\frac{2\times34{,}000{,}000\times24}{3\times365-449}$

c) $\frac{2\times34{,}000{,}000}{(3\times365-449)\times24}$

d) $\frac{34{,}000{,}000\times24}{2\times(3\times365-449)}$

e) $\frac{34{,}000{,}000}{(3\times365-449)\times24\times2}$

31. A quadratic equation with solutions $2+\sqrt{10}$ and $2-\sqrt{10}$ is:

a) $x^2-4x-6=0$ b) $x^2+2x-5=0$

c) $x^2+4x+6=0$ d) $x^2-2x+\sqrt{10}=0$

e) $x^2-2x+10=0$

32. The equation $x-1=\sqrt{x+5}$ has exactly:

a) two positive solutions
b) two negative solutions
c) one positive and one negative solution
d) one positive solution
e) one negative solution

33. The expression $x-x^{-1}$ is equal to:

a) 1 b) 0 c) $\frac{x^2-1}{x}$

d) $\frac{x-1}{x}$ e) x^2-1

34. The numbers satisfying the inequality $x^2>2x+3$ are:

a) $x>3$ b) $-3<x<1$ c) $-1<x<3$

d) $x>3$ or $x<-1$ e) $x<-3$ or $x>1$

35. The domain of the function $g(x)=\sqrt{6-3x}$ is:

a) $x<0$ b) $x\geq 2$ c) $x<2$

d) $x>0$ e) $x\leq 2$

36. The product of the complex numbers $1+i$ and $2-3i$ is:

a) $5-i$ b) $3-2i$ c) $5+5i$

d) 5 e) $-1-i$

37. Given $f(x)=\frac{x+2}{2x-1}$, exactly one of the following numbers is NOT in the domain of f. It is:

a) -2 b) -1 c) 0 d) .5 e) 4

38. The solution of the equation $2^{3x}=\frac{1}{32}$ is:

a) $-\frac{5}{3}$ b) $-\frac{5}{6}$ c) $\frac{5}{3}$ d) $\frac{16}{3}$ e) $\frac{32}{3}$

39. If $x>0$, then $\log\left(\frac{x+1}{x}\right)$ equals:

a) $\log\frac{1}{x}$ b) $\log(x+1)+\log x$

c) $\log(x+1)-\log x$ d) $\frac{\log(x+1)}{\log x}$

f) $[\log(x+1)][\log x]$

40. If $f(x)=x^2-1$ and $g(x)=2\sqrt{x+1}$, then $f(g(x))$ equals;

a) $4x+3$ b) $2x+1$ c) $4x+5$

d) $2x+3$ e) $2x$

41. Given that $x = 1$ is a root of the equation $x^3 - 2x^2 + 3x - 2 = 0$, the other roots are:

a) -1 and 2 b) $\frac{1}{2} \pm \frac{\sqrt{7}}{2}i$ c) -2 and 1

d) 0 and 3 e) $\frac{3}{2} \pm \frac{\sqrt{17}}{2}i$

42. Solve the system of equations:

$$\begin{aligned} 2x - y - z &= -2 \\ 2y + z &= 4 \\ 6x + y &= 0 \end{aligned}$$

The value of x is:

a) -1 b) $-\frac{1}{2}$ c) 1

d) infinitely many values for x

e) the system has no solution

43. Which of the following is equal to $-\frac{\sqrt{3}}{2}$?

a) $\cos 120^\circ$ b) $\sin 225^\circ$ c) $\cos 240^\circ$

d) $\sin 240^\circ$ e) $\sin 120^\circ$

44. An angle has radian measure $\frac{12\pi}{5}$. Its degree measure is:

a) .1315 b) 216 c) 432

d) 864 e) $\frac{\pi^2}{75}$

45. The expression $\tan x + \cot x$ is identically equal to:

a) 1 b) 2 c) $\sec x \csc x$

d) $\sec^2 x + \csc^2 x - 2$ e) $\sec x + \csc x$

46. If $\tan x = \frac{12}{5}$, and $\sin x = \frac{12}{13}$, then $\sin 2x$ is:

a) $\frac{25}{156}$ b) $\frac{5}{13}$ c) $\frac{13}{24}$

d) $\frac{120}{169}$ e) $\frac{10}{13}$

47. If $f(x) = \sin^2 x + \tan x$, then $f\left(\frac{\pi}{3}\right)$ equals:

a) $\frac{3}{4} - \sqrt{3}$ b) $\frac{3}{4} + \sqrt{3}$ c) $\frac{\sqrt{3}}{2} + \sqrt{3}$

d) $\frac{4}{3} + \frac{1}{\sqrt{3}}$ e) $\frac{3}{4} + 2\sqrt{3}$

48. The period of $f(x) = 2\cos 3x$ is:

a) $\frac{\pi}{3}$ b) $\frac{\pi}{2}$ c) $\frac{2\pi}{3}$

d) $\frac{3\pi}{2}$ e) 2π

49. Solve the following equation for $\cos x$.

$\cos^2 x - \sin^2 x + \cos x = 0$

a) $\cos x = \frac{\sqrt{3}}{2}$ or 0 b) $\cos x = \frac{1}{2}$ or -1

c) $\cos x = -\frac{\sqrt{3}}{2}$ or 0 d) $\cos x = -\frac{1}{2}$ or 1

e) $\cos x = 0$ or 1

50. If $\tan^{-1} x = \frac{\pi}{3}$, then x equals:

a) $-\frac{\sqrt{3}}{2}$ b) $\frac{1}{2}$ c) $\frac{\sqrt{2}}{2}$

d) $\frac{\sqrt{3}}{2}$ e) $\sqrt{3}$

51. Exactly one of the following statements is <u>false.</u> It is:

a) $|\sin x| \le 1$ for all x

b) $\cos^2 x \le 1$ for all x

c) $\sec x \ge 1$ if $-\frac{\pi}{2} < x < \frac{\pi}{2}$

d) $\tan x$ is undefined for $x = n\pi$, $n = 1,2,3\ldots$

e) $\tan x = \cot x$ for $x = \frac{\pi}{4} + n\pi$, $n = 1,2,3\ldots$

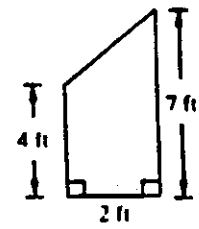
52. A juice can is 8 inches high and has a radius of 3 inches. Find its volume in cubic inches:

a) 16π b) 24π c) 36π

d) 48π e) 72π

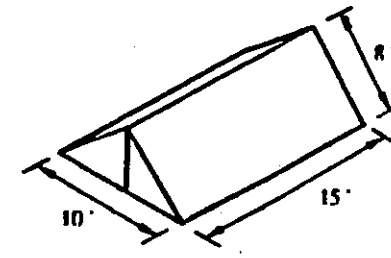
53. The area of the figure on the right in square feet is:

a) 11
b) 13
c) 14
d) 22
e) 28



54. How many square feet of canvas are needed to cover the slanted sides and bottom of the open ended tent pictured on the right?

a) 1200
b) 390
c) 270
d) 240
e) 230



55. An equation of the line graphed below is:

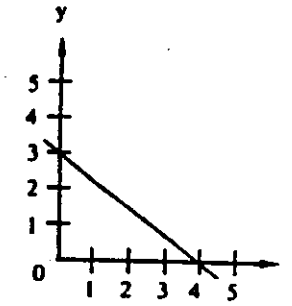
a) $y = \frac{3}{4}x + 3$

b) $y = \frac{3}{4}x + 4$

c) $y = -\frac{3}{4}x + 3$

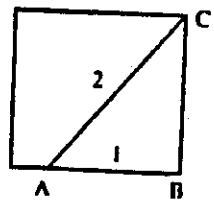
d) $y = -\frac{3}{4}x + 4$

e) $y = -\frac{4}{3}x + 4$



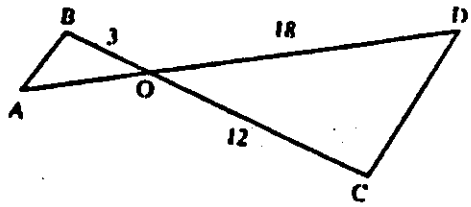
56. The given figure is a square in which $\overline{AB}$ has length 1 and $\overline{AC}$ has length 2. The area of the square is:

a) $\sqrt{3}$
b) $\sqrt{5}$
c) 3
d) 4
e) 5



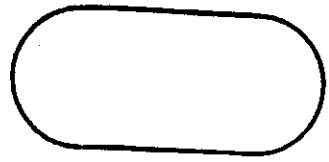
57. In the figure below, line segments $\overline{AB}$ and $\overline{CD}$ are parallel. The length of $\overline{AO}$ is:

a) 2
b) 3.5
c) 4
d) 4.5
e) 9



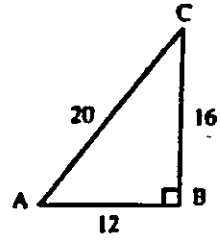
58. An athletic field is to be constructed in the shape of a rectangular region with a semicircular region at each end as in the figure below. If the rectangular region is 110 yards long and 70 yards wide, what is the total area of the field in square yards?

a) $7700 + 70\pi$
b) $7700 + 140\pi$
c) $7700 + 1225\pi$
d) $7700 + 2450\pi$
e) $7700 + 4900\pi$



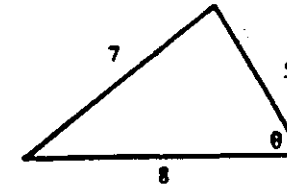
59. In the given triangle, the value of sec A is:

a) $\frac{3}{5}$ b) $\frac{3}{4}$
c) $\frac{4}{5}$ d) $\frac{5}{4}$
e) $\frac{5}{3}$



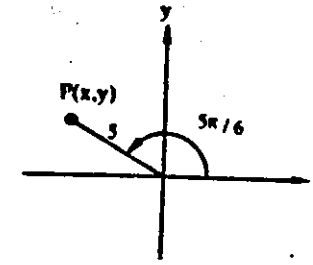
60. In the given triangle, cos θ equals:

a) $\frac{1}{2}$ b) $\frac{5}{8}$
c) $\frac{7}{8}$ d) 1
e) $\frac{8}{7}$



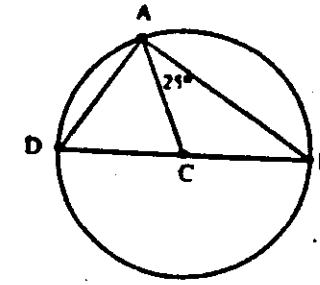
61. In the figure, the coordinates of point P are:

a) (-3, 4)
b) (-9, 16)
c) $\left(-\frac{5\sqrt{3}}{2}, \frac{5}{2}\right)$
d) $\left(-\frac{5}{2}, \frac{5\sqrt{3}}{2}\right)$
e) (-4,3)



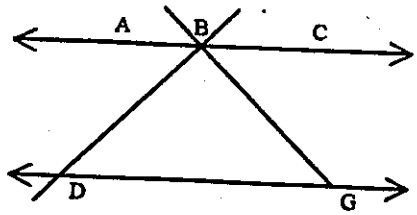
62. If $\overline{DB}$ is a diameter of circle C, and $m\angle CAB$ is 25°, then $m\angle ADC$ is:

a) 45°
b) 50°
c) 55°
d) 60°
e) 65°



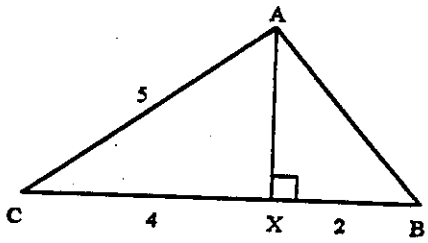
63. Lines $\overline{DG}$ and $\overline{AC}$ are parallel. $m\angle ABD$ is 38° and $\angle DBG$ is a right angle. The $m\angle BGD$ is:

a) 38°
b) 52°
c) 76°
d) 128°
e) 142°



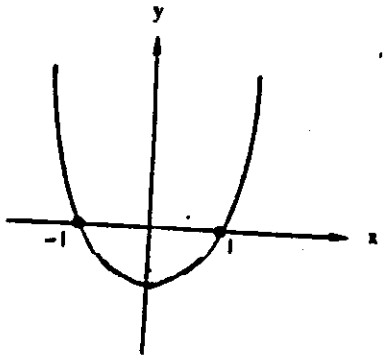
64. In the figure on the right, the length of $\overline{AB}$ is:

a) $\sqrt{3}$
b) 3
c) $\sqrt{13}$
d) 5
e) 13



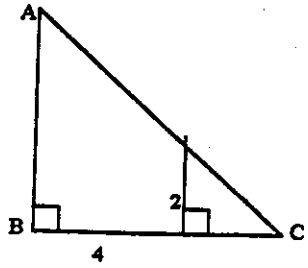
65. The graph shown below is best represented by the equation:

a) $y = x^2 - 1$
b) $x = y^2 - 1$
c) $y = x^2 + 1$
d) $x = y^2 + 1$
e) $y = x^2$



66. ABC is an isosceles right triangle. Its area is:

a) 12
b) 18
c) 24
d) 32
e) 36

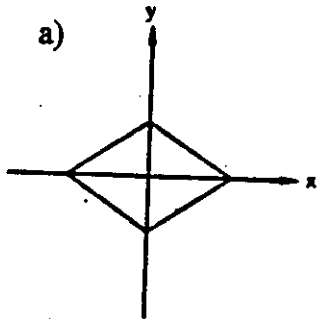


67. Astronauts at point A are M miles above the surface of the earth. They make a rough measurement of $\angle OAH$, the angle between the directions to the horizon(H) and the center of the earth(O). If $m\angle OAH$ is 45 degrees, what is the radius of the earth?

a) $\frac{M}{\sqrt{2}}$
b) $\frac{M\sqrt{3}}{2}$
d) $\frac{M}{\sqrt{2}-1}$
e) $M\sqrt{3}$

68. Exactly one of the following diagrams is the graph of a function. It is:

a)



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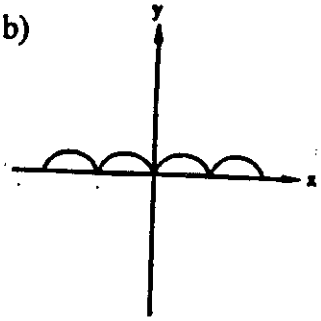

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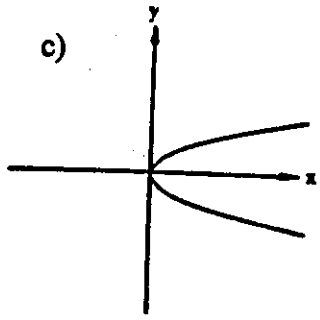
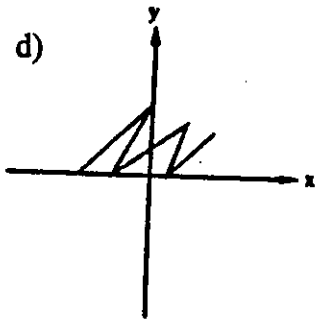


d)



e)