Pre-Calculus Pre-Comprehensive Exam Review Problems

1. *Given the following equations, which are functions?*

(A) $y^2 = 1 - x^2$ **(B)** $y = 9$ **(C)** $y = x^3 - 5x$

(D) $5x + 2y = -10$ **(E)** $y = \pm\sqrt{1 - 2x}$ **(F)** $y = \frac{3}{x} + 5$

a. *all of the above* **b.** *none of the above* **c.** $B, C, D,$ *and* F

d. C, D, F **e.** C *only* **f.** C *and* F

2. *Given* $f(x) = \frac{x^2-1}{x+4}$, *find* $f(-3)$.

a. -10 **b.** 10 **c.** -8 **d.** 8 **e.** $\frac{8}{7}$

3. *Given* $f(x) = \frac{x^2+3}{x-5}$, *find* $f(\frac{1}{4})$

a. $\frac{49}{76}$ **b.** $-\frac{49}{76}$ **c.** $-\frac{47}{84}$ **d.** $\frac{47}{84}$

5. *What is the domain of this function:* $f(x) = \frac{3-x}{x+5}$

a. $(-\infty, -5) \cup (3, \infty)$ **b.** $x \neq -5, x \neq 3$ **c.** $x \neq -5$ **d.** $(-5, 3)$

6. *What is the range of this function:* $y = x^2 - 5$

a. $(-\infty, \infty)$ **b.** $[5, \infty)$ **c.** $[-5, \infty)$ **d.** $(-\infty, -5]$

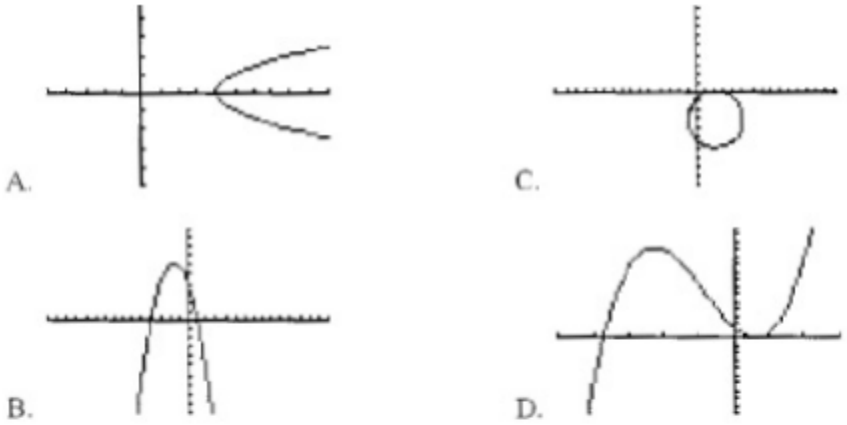


FIGURE 1

7. *Determine which of the following graphs in Figure (1) is the graph of a function.*

a. *A only*

b. *B only*

c. *B and D*

d. *all of these are fuctions*

e. *none of these are functions*

9. *Given the line* $2y = 3x - 6$*, what is the slope and y-intercept?*

a. $m = 3, y - int. = -6$ **b.** $m = 3, y - int. = 2$

c. $m = \frac{3}{2}, y - int. = -6$ **d.** $m = \frac{3}{2}, y - int. = -3$

10. *Find the equation of the line perpendicular to* $x - 2y + 5 = 0$ *passing through* $(0, 4)$.

a. $y = \frac{1}{2}(x - 5)$ **b.** $y = 2x + 4$ **c.** $y = -\frac{1}{2}x + \frac{5}{2}$ **d.** $y = -2x + 4$

11. *Find the equation of a line through the points* $(3, 2)$ *and* $(-3, 6)$.

a. $2x + 3y = 12$ **b.** $3x + 2y = -12$ **c.** $-3x + 2y = 4$ **d.** $-2x - 3y = 4$

12. *Find the equation of a line with x-intercept=2 and y-intercept=-1.*

a. $y = -\frac{1}{2}x - 1$ **b.** $y = -2x - 1$ **c.** $y = \frac{1}{2}x - 1$ **d.** $y = -2x + 1$

13. *Given the line:* $3x + 2y = 7$*, which of the following line is perpendicular to this line.*

a. $y = \frac{3}{2}x + 4$ **b.** $y = -\frac{2}{3}x - 4$ **c.** $y = \frac{2}{3}x + 3$ **d.** $y = -\frac{2}{3}x + 5$

14. *Find the equation of a line through the point* $(2, 1)$ *and parallel to the line* $5x - 2y = 7$.

a. $2x - 5y = 8$ **b.** $5x - 2y = 8$ **c.** $5x + 2y = -4$ **d.** $-2x + 5y = 4$

19. *For the function* $f(x) = 3x^2 - 2x + 5$*, find* $f(2x - 3)$

a. $4x^2 - 12x + 20$ **b.** $12x^2 + 40x + 16$ **c.** $3x^2 + 2$ **d.** $12x^2 - 40x + 38$

20. *If a graph is symmetric with respect to the y-axis and the point* $(2, 4)$ *is on the graph, then what point is also on the graph?*

a. $(-2, 4)$ **b.** $(3, 4)$ **c.** $(2, -4)$ **d.** $(-2, -4)$

23. *The graph of* $y = |x|$ *is shifted to the right 4 units and reflected across the x-axis. Write the equation of the new function.*

a. $y = |x| + 4$ **b.** $y = -|x + 4|$ **c.** $y = -|x| + 4$ **d.** $y = -|x - 4|$

24. *y varies directly as* x^2 *and inversely as z; y=4 when x=4 and z=2. Find y when x=2 and z=4.*

a. $y = 2$ **b.** $y = \frac{1}{2}$ **c.** $y = -2$ **d.** $y = 10$

25. *The velocity v of a falling object is directly proportional to the time t of the fall. If, after 2 seconds, the velocity is 64 ft sec. What is the velocity after 5 sec.*

a. 26.4 $ft\,\text{sec}$ **b.** 160 $ft\,\text{sec}$ **c.** $\frac{5}{32}$ $ft\,\text{sec}$ **d.** 1600 $ft\,\text{sec}$

28. *Find the midpoint of a line segment from* $(-6, 0)$ *and* $(2, -4)$.

a. $M = (-2, -2)$ **b.** $M = (-3, -4)$ **c.** $M = -1, -3)$ **d.** $M = (0, -1)$

29. *Find the distance between* $(-2, 5)$ *and* $(3, 4)$.

a. $d = \sqrt{26}$ **b.** $d = \sqrt{58}$ **c.** $d = -\frac{1}{5}$ **d.** $d = \sqrt{29}$

30. *Given the circle with center* $(2, -5)$ *and radius of 4. What is the equation of the circle.*

a. $x^2 - y^2 + 4x - 10y = -13$ **b.** $x^2 + y^2 + 4x - 10y = -13$

c. $x^2 + y^2 + 4x + 10y = 45$ **d.** $x^2 + y^2 - 4x + 10y = -13$

31. *What is the center of circle:* $x^2 + y^2 + 2x - 6y + 9 = 0$

a. $(1, 3)$ **b.** $(-2, 6)$ **c.** $(-1, 3)$ **d.** $(2, 3)$

33. *Solve for* t_2*:* $S = \frac{A}{r(t_1 - t_2)}$

a. $srt_1 - A$ **b.** $\frac{Srt_1 - A}{Sr}$ **c.** $t_1 - A$ **d.** $\frac{A - Srt_1}{Sr}$

34. *Mani pays* \$135.45 *for a new bike. If the price paid includes a* 7.5% *sales tax, which is the price of the bike itself?*

a. \$119.50 **b.** \$122.80 **c.** \$123.00 **d.** \$126.00

35. *Multiply:* $(4 - i)^2$

a. $17 - 4i$ **b.** $16 + 2i$ **c.** $15 - 8i$ **d.** $17 - 8i$

36. *Divide:* $\frac{4-3i}{2+5i}$

a. $\frac{23}{29} - \frac{28}{29}i$ **b.** $-\frac{7}{29} - \frac{26}{29}i$ **c.** $-\frac{7}{29} + \frac{14}{29}i$ **d.** $\frac{1}{3}$

37. *Find the value of* i^{50}

a. -1 **b.** 1 **c.** $-i$ **d.** i

38. *Solve* $3x^2 - 10x + 5 = 0$*. Simplify your answer.*

a. $\frac{5 \pm \sqrt{10}}{3}$ **b.** $\frac{5 \pm \sqrt{17}}{3}$ **c.** $\frac{10 \pm \sqrt{10}}{3}$ **d.** $5 \pm \sqrt{10}$

39. *Solve in the complex number system:* $x^2 + 3 = x$

a. $\frac{1 \pm \sqrt{11}i}{2}$ **b.** $\frac{1 \pm \sqrt{11}}{2}$ **c.** $\frac{1 \pm \sqrt{17}i}{2}$ **d.** $\frac{-3 \pm \sqrt{3}i}{2}$

44. *Find the vertex of this parabola:* $f(x) = -x^2 + 2x + 8$

a. $(-1, 8)$ **b.** $(9, 1)$ **c.** $(2, 8)$ **d.** $(1, 9)$

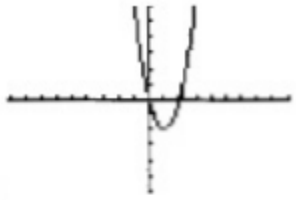
45. *Does the parabola above:*

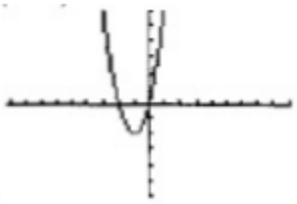
a *Open up* **b** *Open down*

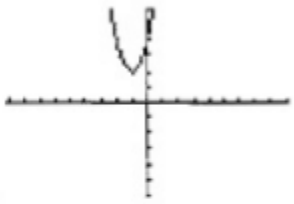
46. *Find the line of symmetry of the given function* $y = 2x^2 - 8x + 4$

a. $x = -4$ **b.** $x = 2$ **c.** $x = 4$ **d.** $x = -2$

47. *Match the equation to the correct graph:* $y = 2(x+1)^2 - 2$

a. 

c. 

b. 

d. 

48. *Solve the following:* $\frac{3}{x-2} = \frac{1}{x-1} + \frac{7}{(x-1)(x-2)}$

a. *no solution* **b.** $x = -4$ **c.** $x = 3$ **d.** $x = 4$

49. *Solve the following:* $\sqrt{12 - x} = x$

a. $x = 6$ **b.** $x = -6$ **c.** $x = 3$ **d.** $x = \{-3, 4\}$ **e.** $x = \{-4, 3\}$

50. *Solve:* $|3m - 1| = 6$

a. $\frac{7}{3}$ **b.** $-\frac{7}{3}, \frac{7}{3}$ **c.** $-\frac{5}{3}, \frac{7}{3}$ **d.** $-\frac{5}{3}$

51. *Solve the inequality:* $-32 \leq \frac{32-4x}{8} \leq 32$

a. $[-56, 72]$ **b.** $[0, 16]$ **c.** $[-72, -56]$ **d.** $[-16, 0]$

52. *Solve the inequality:* $|32 - 4x| < 32$

a. $(-64, 0)$ **b.** $[-64, 0]$ **c.** $[0, 16]$ **d.** $(0, 16)$

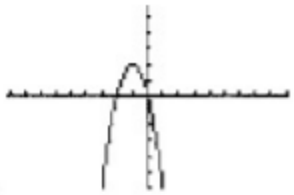
67. *For the functions below and* $(f \circ g)(-2)$.

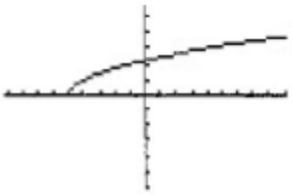
a. 166 **b.** -128 **c.** -156 **d.** -7 **e.** 62 **f.** *none of these*

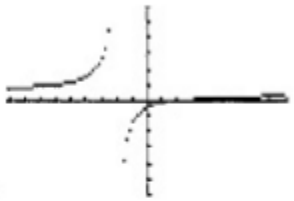
68. *Given that* $f(x) = 3x^2 - 2x + 5$ *and* $g(x) = 3x - 1$, *find* $g \circ f$

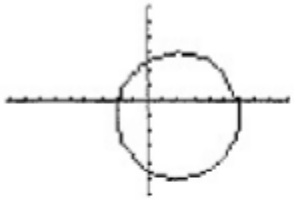
a. $9x^2 - 6x + 14$ **b.** $9x^3 - 9x^2 + 17x - 5$ **c.** $3x^2 + x + 4$ **d.** $9x^2 + 6x - 16$

69. *Determine which of the following functions are one-to-one.*

A. 

B. 

C. 

D. 

a. *A only*

b. *B and C*

c. *D only*

d. *all of the above*

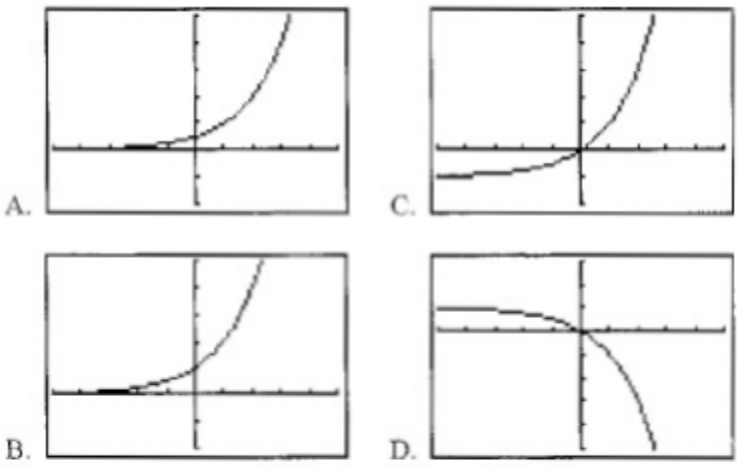
e. *none of the above*

70. *Find the inverse of* $f(x) = 2x + 3$

a. $f^{-1}(x) = \frac{1}{2}(x + 3)$ **b.** $f^{-1}(x) = \frac{1}{2}(x - 3)$

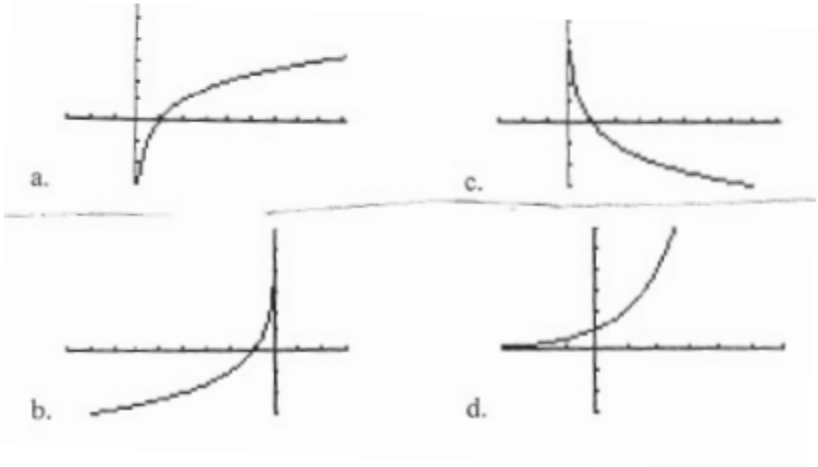
c. $f^{-1}(x) = \frac{2}{x-3}$ **d.** $f^{-1}(x) = \frac{2}{x+3}$

71. *Match the following functions with the correct graphs.*



a. $y = 2^x$ **b.** $y = 2^x - 1$ **c.** $y = 2^{(x-1)}$ **d.** $y = 1 - 2^x$

72. *Graph the following function* $y = \log_2 x$



73. *Convert the following to a logarithmic equation* $e^{-5} = 0.006738$

a. $e = \log_{-5} 0.006738$ **b.** $\ln(0.006738) = -5$

c. $0.006738 = \log_{-5} e$ **d.** $\ln(-5) = 0.006738$

74. *Convert the following to an exponential equation* $\log_{10}(\frac{1}{100}) = -2$

a. $10^{100} = -2$ **b.** $10^{-2} = \frac{1}{100}$ **c.** $(\frac{1}{100})^2 = 10$ **d.** $2^{10} = \frac{1}{100}$

76. *Write* $\log_8 \frac{x^3\sqrt{x^2+4}}{(x+8)^8}$ *as a sum and difference of logarithms. Express all powers as factors.*

a. $\log_8 x+\frac{1}{2}\log_8(x^2+4)-\log_8(x+8)$ **b.** $3\log_8 x+\frac{1}{2}\log_8(x^2+4)+8\log_8(x+8)$

c. $3\log_8 x+\frac{1}{2}\log_8(x^2+4)-8\log_8(x+8)$ **d.** $3\log_8 x-\frac{1}{2}\log_8(x^2+4)-8\log_8(x+8)$

77. *Find the value of* 3.56^{π}

a. 54.0047 **b.** 540.0466 **c.** 5.4005 **d.** 53.8956

79. *Find* y *such that:* $\log_2 \frac{1}{32} = y$

a. $y = 5$ **b.** $y = -5$ **c.** *none of these* **d.** $y = 0.09834$ **e.** $y = -4$

80. *Solve:* $3\log_8 x = \log_8 216$

a. $x = 36$ **b.** $x = 6$ **c.** $x = 2.44949$ **d.** $x = -6$ **e.** *none of these*

81. *Solve:* $\log_3(x+5) - \log_3 x = 2$

a. $x = 1$ **b.** $x = 5$ **c.** $x = \frac{8}{5}$ **d.** $x = \frac{5}{8}$

82. *Solve:* $\log_2(x+3) = 2 - \log_2 x$

a. $x = 1$ **b.** $x = -1$ **c.** $x = \{-4, 1\}$ **d.** $x = 3.2345$

84. *Solve this equation:* $\log_4(x+3) + \log_4(2-x) = 1$

a. $x = \{-1, 2\}$ **b.** $x = 2$ **c.** $x = 1$ **d.** $x = \{-2, 1\}$

85. *Solve this equation:* $6^{x-3} = 36^{4-3x}$

a. $x = 2$ **b.** $x = \frac{11}{7}$ **c.** $x = 3.987$ **d.** $x = \frac{7}{4}$