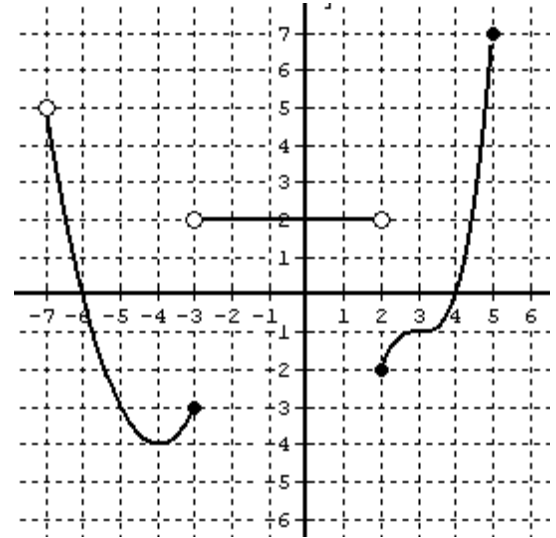


MAC1105 Sample Final Exam - KEY

1) Use the graph to the right to answer questions A – S.

- A) Is the graph a function? YES
- B) Domain: $(-7, 5]$
- C) Range: $[-4, 7]$
- D) x -intercept(s): $-6, 4$
- E) y -intercept: 2
- F) Absolute Maximum value: 7
- G) Absolute Minimum value: -4



For items H – L, State the corresponding x-values using Interval Notation.

- H) Where is the graph increasing? $(-4, -3) \cup (2, 5)$
- I) Where is the graph decreasing? $(-7, -4)$
- J) Where is the graph constant? $(-3, 2)$
- K) Where is $f(x) \geq 0$? $(-7, -6] \cup (-3, 2) \cup [4, 5]$
- L) Where is $f(x) < 0$? $(-6, -3] \cup [2, 4)$

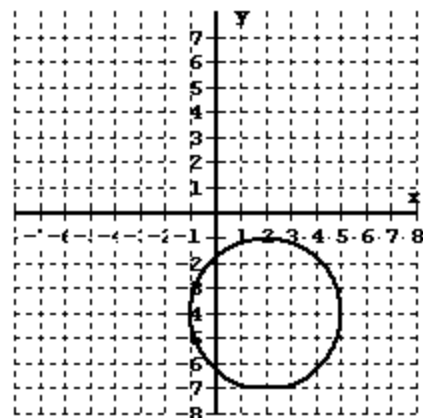
- M) How many times does the line $y = -2$ intersect the graph? 2 times
- N) $f(-5) = -3$
- O) $f(-3) = -3$
- P) $f(2) = -2$
- Q) Where does $f(x) = 0$? List the corresponding value(s) of x . $x = -6, x = 4$
- R) Where does $f(x) = -3$? List the corresponding value(s) of x . $x = -5, x = -3$

S) Find an equation of the piecewise-defined function graphed above:

$$f(x) = \begin{cases} (x + 4)^2 - 4 & \text{for } -7 < x \leq -3 \\ 2 & \text{for } -3 < x < 2 \\ (x - 3)^3 - 1 & \text{for } 2 \leq x \leq 5 \end{cases}$$

2) Graph the Circle: $(x - 2)^2 + (y + 4)^2 = 9$

- B) State the Domain: $[-1, 5]$
- C) State the Range: $[-7, -1]$



3) Let $f(x) = 3x^2 + 2x - 1$ and $g(x) = 2x - 7$

A) $f(-2) = 7$

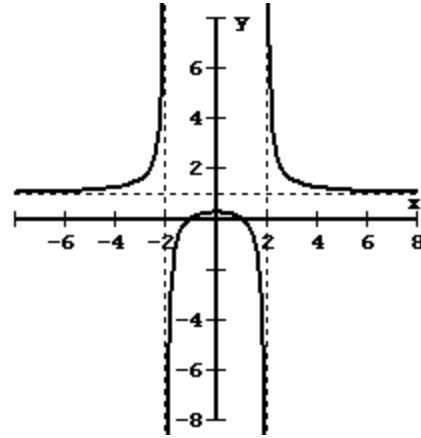
B) $(f + g)(1) = 4 + (-5) = -1$

C) $(f \circ g)(5) = f(g(5)) = f(3) = 32$

D) $(f - g)(x) = 3x^2 + 6$

E) $g(f(x)) = 6x^2 + 4x - 9$

F) $g^{-1}(x) = \frac{x + 7}{2}$



4) Sketch the **graph** of $f(x) = \frac{x^2 - 1}{x^2 - 4}$.

5) $y = -3(x - 2)^2 + 1$

6) $y = -2x + 1$

7) $(x + 2)^2 + (y - 1)^2 = 9$

8) $y = -(x + 3)^3 - 2$

9) $y = \sqrt{x + 4} + 1$

10) $y = |x + 1| - 4$

11) $y = (x + 4)(x + 1)(x - 2)(x - 3)$

12) $y = -(x + 5)^2(x + 2)(x - 1)^3$

13) $y = 6(x + 2)\left(x + \frac{1}{3}\right)\left(x - \frac{1}{2}\right)$ or $y = (x + 2)(3x + 1)(2x - 1)$

14) Use the **quadratic formula** to solve: $3x^2 - 8x + 2 = 0$ $x = \frac{4 \pm \sqrt{10}}{3}$

15) Solve: $x^4 - 3x^3 - 9x^2 + 15x + 20 = 0$ $x = -1, x = 4, x = \pm\sqrt{5}$

16) A) Area = $200e^{(-0.35*2)} \approx 99.3 \text{ mm}^2$ B) $t = \frac{\ln(0.25)}{-0.35} \approx 3.96 \text{ days}$

17) $x = \ln(40) - 1 \approx 2.69$

18) $x = \frac{\log(50)}{\log(2)} \approx 5.64$

19) $x = \frac{100}{3} \approx 33.33$

20) $x = \frac{8}{5} = 1.6$

Where is (x-values):

$$f(x) \geq 0 : (-\infty, -2) \cup [-1, 1] \cup (2, \infty)$$

$$f(x) \leq 0 : (-2, -1] \cup [1, 2)$$