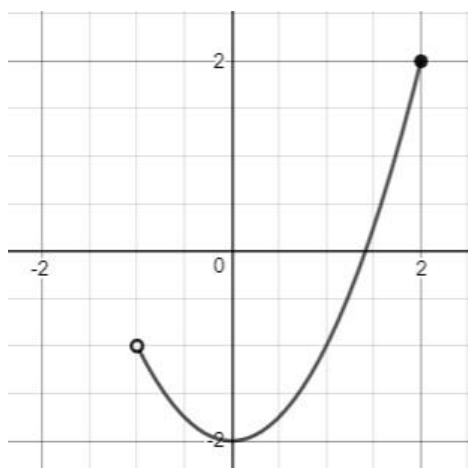


Mat 171 –Exam 1 Review Problems

1. Use the given graph to find the following:



(a) domain

(b) range

(c) all x values that satisfy $f(x) = -\frac{3}{2}$

2. Find the domain of the following functions:

(a) $f(x) = \frac{1-x}{x^2+x-6}$ (b) $f(x) = \sqrt{8-2x}$

3. Given the function $f(x) = \frac{x^3}{3} - 4x + 5$, find the following:

(a) open intervals where is increasing, decreasing and constant.

(b) local maximum and minimum points.

4. Evaluate the difference quotient

(a) $f(x) = 3x^2 - 5x + 2$ (b) $g(x) = \frac{5}{x}$

5. Evaluate the piece-wise function and sketch a graph.

$$f(x) = \begin{cases} \sqrt{4-x} & x < -3 \\ 3x & x \geq -3 \end{cases} \quad f(-2) \text{ and } f(-5)$$

6. Determine algebraically or graphically if the following functions are even, odd or neither.

(a) $f(x) = 2x^2 - 7$ (b) $g(x) = x^3 + 3x - 5$ (c) $h(x) = \sqrt[3]{x}$

7. (a) Find the function $g(x)$ after applying the following transformations to x^2 :

reflect about the x -axis, shift left 5 units, shift up 3 units

(b) Use transformations on x^2 to graph $f(x)$ and describe the transformations in words:

$$f(x) = 3(x - 1)^2$$

8. Given $f(x) = 3x^2 + x - 1$ and $g(x) = 3x - 2$, find the following:

(a) $(f - g)(x)$ (b) $\left(\frac{f}{g}\right)(x)$ (c) $(f \circ g)(x)$ (d) $(g \circ f)(2)$

9. Find inverse functions for the following one-to-one functions and find the domain and range of each inverse:

(a) $f(x) = \frac{x}{2x-3}$

(b) $f(x) = x^2 - 1, x \geq 0$

10. For the quadratic function $f(x) = -2x^2 - 12x - 17$, find:

(a) vertex (b) axis of symmetry (c) y -intercept (d) x -intercept(s)

11. A projectile is shot from a 350 foot cliff. The quadratic function $s(t) = -15t^2 + 90t + 350$ models the projectile's height above ground, in feet, t seconds after it was shot. When does it reach its maximum height? What is the maximum height? Find the number of seconds it takes for the projectile to reach the ground. (round to the nearest tenth)

12. Find zeros, list multiplicity and determine end-behavior

(a) $f(x) = x^3 - 7x^2 + 11x$ (b) $f(x) = 2x^3 - 3x^2 - 12x + 20$

13. Find all zeros: $p(x) = x^3 + 10x^2 + 41x + 50$

14. Find a 3rd degree polynomial function with zeros $-\frac{2}{3}$ and $1 - 4i$ and $p(0) = 17$.

15. The following rational function in hundreds models the population of a certain species of animal, where t is in days. What number does the population approach in the long run?

$$P(x) = \frac{10x^3 + 2}{2x^3 + 1}$$

16. Find all asymptotes and holes:

$$(a) R(x) = \frac{3x+2}{x^2-1}$$

$$(b) f(x) = \frac{4x^3}{x^2-7x}$$