

Math 150 Exam 1 Review Problem Set

Note: This exam review does not cover every topic that could be covered on your exam.

Please take a look at previous Week in Reviews for more practice problems.

(This WIR is more heavily weighted on Sections 2.4-2.8 since there has not been a review on these sections yet.)

1. Graph the following functions by using transformations.

(a) $f(x) = -\frac{1}{2}|x - 2|$

(b) $f(x) = 3\sqrt{x + 3} + 2$

2. A function $f(x)$ is horizontally stretched by a factor of 5, reflected across the y -axis, vertically stretched by a factor of 5, and then shifted down 4. Write a function $g(x)$ in terms of $f(x)$ that represents the resulting graph.

3. Determine whether the following functions are even, odd, or neither.

(a) $f(x) = x^2 - \sqrt[5]{x}$

(b) $f(x) = |x| - 5x^{-4}$

4. For the quadratic function below, write in standard form, find the vertex of the parabola, and find the maximum or minimum value.

$$f(x) = -3x^2 - 18x - 31$$

5. For the quadratic function below, find the maximum or minimum value and state the range.

$$f(x) = 5x^2 + 6x + 4$$

6. Suppose $f(x) = \frac{1}{\sqrt{x^2 + x - 2}}$ and $g(x) = \frac{\sqrt{x + 3}}{x^2 - 9x + 20}$.

(a) Find the domain of f .

(b) Find the domain of g .

(c) Find the domain of $f + g$, $f - g$, and fg .

(d) Calculate $(f + g)(2)$ and $(fg)(6)$.

(e) Find $\frac{f}{g}$ and its domain.

7. Let $f(x) = \frac{x}{x + 6}$ and $g(x) = x - 1$.

(a) Find $f \circ g$ and its domain.

(b) Find $f \circ f$ and its domain.

8. Let $f(x) = 2x^2 - 3x$ and $g(x) = 2x^3 + x$. Calculate the following. Expand fully to polynomial form.

(a) $f \circ g$

(b) $g \circ f$

9. Determine whether the following define y as a function of x . If y IS a function of x , state whether it is a one-to-one function.

(a) $y - 5 = 3|x - 2|$

(b) $xy^2 + 3y^2 = x$

(c) $y^3 = -8x$

10. Find inverse functions for the following.

(a) $f(x) = \sqrt[3]{x^5 + 9}$

(b) $f(x) = \frac{x}{x+4}$

11. (Taken from *Pracalculus: Functions and Graphs* by Swokowski/Cole)

A man is in a rowboat that is 2 miles from the nearest point A on a straight shoreline. He wishes to reach his house, which is located at a point B that is 6 miles farther down the shoreline from A . He plans to row to a point P that is between A and B and then walk the remainder of the distance. Suppose he can row at a rate of 3 mi/hr and can walk at a rate of 5 mi/hr.

(a) If T is the total time required to reach the house, express T as a function of x , where x is the distance from P to B .(b) What is the shortest possible travel time? What distance x will result in the shortest travel time?

12. A very large bottle contains 2000 mL of 10% acid solution. An 80% acid solution is being poured into the bottle at a rate of 10 mL/sec.

(a) Express the concentration C of the bottle as a function of time t .

(b) When will the concentration be 60%?

13. Find the average rate of change of the function $f(x) = \frac{x^2}{x+1}$ from $x = 5$ to $x = 5 + h$.

14. Solve the following equations.

(a) $3x^{1/3} + 2x^{-2/3} - 2x^{-5/3} = 0$

(b) $\frac{1}{x-2} + \frac{11}{3x+1} = \frac{28}{(x^2-4)(3x+1)}$

(c) $9x^3 - 18x^2 - 4x + 8 = 0$

(d) $\sqrt{4x-19} + 4 = x$

(e) $16x - 24\sqrt{x} + 9 = 0$

15. Solve the following inequalities.

(a) $\frac{4}{2x+3} \geq 1$

(b) $-|6x-11| + 5 \leq 3$

16. Simplify the following expression and write without negative exponents: $\left(\frac{25x^4y^{-2}}{z^6}\right)^{3/2} \left(\frac{y^{-3}z}{x^5}\right)^{-3}$ 17. Simplify the following expression: $\sqrt[6]{3^{15}x^{22}y^{14}}$ 18. Find the center and radius of the circle $x^2 + y^2 + 8x - 10y + 37 = 0$.19. Consider the points $(4, 6)$ and $(-6, 2)$.

(a) Find the distance between these points.

(b) Find the equation of the line that is parallel to the line $5x + 8y = 12$ and passes through the midpoint of the line segment between these points.

20. Consider the function $f(x) = \sqrt{|x-2|} + x^4 - 5x^2 + 2x + 3$.

- (a) Find the x -intercepts of f .
- (b) Where is f decreasing?
- (c) What is the range of f ?
- (d) Solve the equation $f(x) = x^{1/3} - 2$.

21. True or False

- (a) TRUE FALSE To rationalize the numerator of $\frac{\sqrt{x} + 10}{x^2}$, multiply numerator and denominator by $\sqrt{x} + 10$.
- (b) TRUE FALSE If L_1 has slope -4 and L_2 is perpendicular to L_1 , then L_2 has slope 4 .
- (c) TRUE FALSE The equation $y = -\frac{1}{20}x^2 + x - 5$ has exactly one real solution.
- (d) TRUE FALSE A graph that is symmetric about the x -axis and the y -axis must also be symmetric about the origin.