

Math 150 Exam 1 Review Problem Set

Note: This exam review does not cover every topic that could be covered on your exam. It is more heavily weighted on Sections 2.6-2.8. Please take a look at the previous Week in Reviews for more practice problems on other sections.

1. Suppose $f(x) = \frac{1}{\sqrt{x^2 + x - 2}}$ and $g(x) = \frac{x - 3}{x^2 - 9x + 20}$.
 - (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 $(f + g)(2)$, $(f - g)(-3)$, and $(fg)(3)$.
 - (e) Find $\frac{f}{g}$ and its domain.

2. Let $f(x) = \frac{x}{x + 6}$ and $g(x) = x - 1$.
 - (a) Find $g \circ f$ and its domain.
 - (b) Find $f \circ g$ and its domain.
 - (c) Find $f \circ f$ and its domain.

3. Let $f(x) = x^2 - 2$ and $g(x) = x^3 + 1$. Calculate $f \circ g$ and $g \circ f$.

4. Determine whether the following functions are one-to-one.
 - (a) $f(x) = 3|x - 2| + 5$
 - (b) $f(x) = -2x^3 + 7$
 - (c) $f(x) = (x + 7)^2 - 6$

5. Show that $f(x) = \frac{5}{x + 3}$ and $g(x) = \frac{5 - 3x}{x}$ are inverses of each other.

6. Find the inverse function for $f(x) = \sqrt[3]{x^5 + 9}$.

7. Determine how the graph of $g(x)$ would be obtained from the graph of $f(x)$.
 - (a) $g(x) = -\frac{2}{3}(x + 4)^3 + 7$; $f(x) = x^3$
 - (b) $g(x) = -4f(-3x) - 9$

8. Find the maximum/minimum of the quadratic function $f(x) = 4x^2 + 12x + 5$ by writing it in standard form. Then find the x and y intercepts.

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

A real estate company owns 218 efficiency apartments, which are fully occupied when the rent is \$940 per month. The company estimates that for each \$25 increase in rent, 5 apartments will become unoccupied.

 - (a) Find a function which models the monthly revenue of the company, R , in terms of the rental cost, x .

(b) What rent should be charged so that the company will have maximum revenue?

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

A man in a rowboat that is 2 miles from the nearest point A on a straight shoreline wishes to reach a house located at a point B that is 6 miles farther down the shoreline from point A . He plans to row to a point P that is between A and B and is x miles from the house, and then he will 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. If T is the total time required to reach the house, express T as a function of x .

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

12. Solve the following equations.

(a) $3x^2 + 2x - 2 = 0$

(b) $3x^{1/2} + 4x^{1/4} - 4 = 0$

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

13. Solve the inequality $\frac{4}{2x+3} \leq \frac{1}{x-2}$.

14. Simplify the expression $\left(\frac{25x^4y^{-2}}{z^6}\right)^{3/2} \left(\frac{y^{-3}z}{x^5}\right)^{-3}$.

15. Find the center and radius of the circle $x^2 + y^2 + 8x - 10y + 37 = 0$.

16. 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.

17. True or False

(a) TRUE FALSE If a function is odd, then $f(-x) = -f(x)$

(b) TRUE FALSE If a function is symmetric about the y -axis, it is an even function.

(c) TRUE FALSE If $|x| \geq b$, then $-b \leq x \leq b$.

(d) TRUE FALSE To rationalize the numerator of $\frac{\sqrt{x+10}}{x^2}$, multiply numerator and denominator by $\sqrt{x} + 10$.

(e) TRUE FALSE The equation $0 = x^2 + 20x + 100$ has exactly one real solution.

(f) TRUE FALSE If the graph of a function is always above the x -axis, then the function is always increasing.

(g) TRUE FALSE If L_1 has slope $-\frac{6}{7}$ and L_2 is perpendicular to L_1 , then the slope of L_2 is $-\frac{7}{6}$.