

Math 150 Week in Review 3 Problem Set

1. Find the equation of the line that

(a) passes through the y -intercept of the line $-2x + 3y = 9$ and is parallel to the line $7x - 4y = 6$.

(b) passes through the x -intercept of the line $3x - 8y = 12$ and is perpendicular to the line $x = 3$.

2. Suppose that the relationship between the cost of utilities and the average temperature in a month is linear. If the average temperature in a month is 96° , your utilities bill is \$100. If the average temperature in a month is 81° , your utilities bill is \$75.

(a) Find an equation that expresses the cost of your utilities, C , in terms of the average temperature, T , in any given month.

(b) How much will your utilities bill increase if the average temperature in the current month is 6° higher than the average temperature last month?

3. Find an equation of the perpendicular bisector of the line segment joining the points $(-1, 2)$ and $(4, 3)$.

4. Determine whether the following equations define y as a function of x .

(a) $x^2 + y^2 = 16$

(b) $x^3y + 4y = 12$

(c) $y^3 - x = 1$

5. Find the domains of the following functions.

(a) $f(x) = \frac{x^3}{\sqrt{x^2 - 9}}$

(b) $f(x) = \frac{\sqrt[4]{x^2 - 6x - 16}}{x^2 + 4x - 21}$.

6. Let $f(x) = \frac{x^2 + 1}{2 - x}$. Evaluate the following.

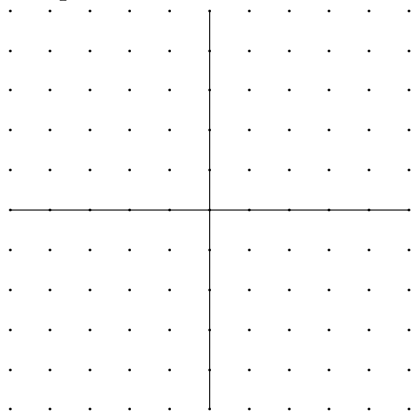
(a) $f(\frac{1}{x})$

(b) $f(-x^2)$

7. Consider the function:

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

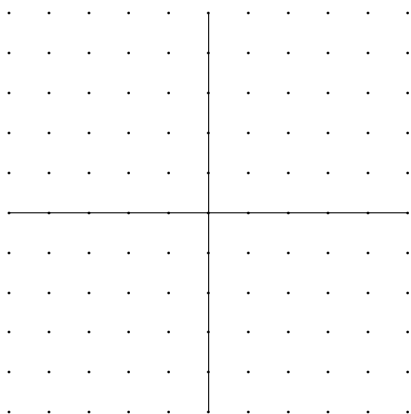
(a) Graph the function.



(b) What are the domain and range of f ?

(c) On what intervals is f increasing? decreasing?

8. Graph the function $f(x) = |x^2 - 4|$ by plotting points.



9. Graph the function $f(x) = x^4 - 5x^3 - 3x^2 + 17x - 10$ using a graphing calculator.

(a) What is the range of this function? (Round decimals to 4 places.)

(b) On what intervals is f increasing? decreasing? (Round decimals to 4 places.)

10. Find the average rate of change for the following functions on the given interval.

(a) $f(x) = \sqrt{x+8}$ from $x = -4$ to $x = 1$

(b) $f(x) = x^2 + 2x - 4$ from $x = 2$ to $x = 2 + h$

(c) $f(x) = \frac{5}{x-4}$ from $x = a$ to $x = a + h$

11. Suppose an object is launched into motion. After 10 seconds, the object has traveled 220 feet. After 15 seconds, the object has traveled a total of 450 feet.
- (a) What was the object's average speed during the first 10 seconds?

(b) What was the object's average speed during the last 5 seconds?

12. If the distance in feet an object has traveled after t seconds is modeled by the function $f(t) = t^3 + 6t$, then what is the object's average speed from $t = a$ to $t = a + h$?