

1. Simplify the difference quotient $\frac{f(x+h)-f(x)}{h}$ for $f(x) = 8x - 11$.

$$\frac{8(x+h) - 11 - (8x - 11)}{h} \rightarrow \frac{8x + 8h - 11 - 8x + 11}{h} \rightarrow \frac{8h}{h} = \boxed{8}$$

2. Find the following:

a. domain $[-3, 5)$

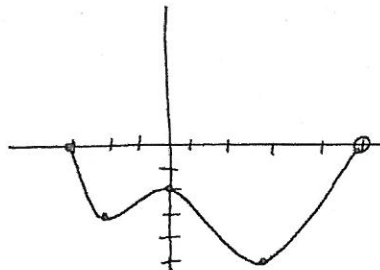
b. range $[-5, 0]$

c. x- and y-intercepts $x \rightarrow -3$
 $y \rightarrow -2$

d. intervals increasing, decreasing, constant

e. $f(3) = -5$

f. relative minima, maxima $\text{max} \rightarrow -2$
 $\text{min} \rightarrow -3, -5$



inc $\rightarrow (-2, 0) \cup (3, 5)$
dec $\rightarrow (-3, -2) \cup (0, 3)$

3. Determine whether each is even, odd, or neither. State the symmetry of each function.

a. $f(x) = x^3 - 5x$

$f(-x) = -x^3 + 5x$

odd

ORIGIN SYMMETRY

b. $f(x) = x^4 - 2x^2 + 1$

$f(-x) = x^4 - 2x^2 + 1$

even

Y-AXIS SYMMETRY

c. $f(x) = 2x\sqrt{1-x^2}$

$f(-x) = -2x\sqrt{1-x^2}$

odd

ORIGIN SYMMETRY

4. Write the equation of a line that is perpendicular to the line $6x - y - 4 = 0$ and passes through $(-12, -1)$.

$y = 6x - 4$

$m = -\frac{1}{6}$

$y = mx + b$

$-1 = (-\frac{1}{6})(-12) + b$

$-1 = 2 + b$

$y = -\frac{1}{6}x - 3$

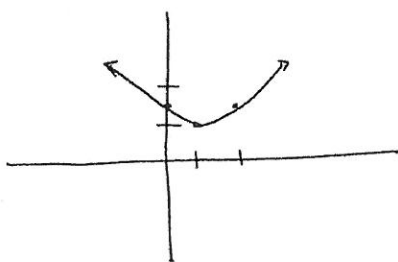
5. Find the average rate of change of $f(x) = x^2 - 4x$ from $x=5$ to $x=9$.

$(5, 5)$ $(9, 45)$

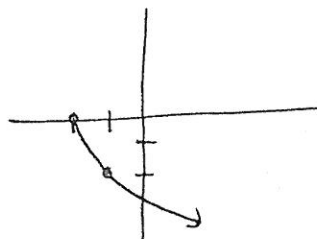
$m = \frac{45-5}{9-5} = \frac{40}{4} = \boxed{10}$

6. Graph:

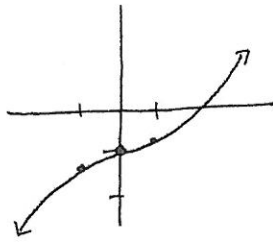
a. $f(x) = \frac{1}{2}(x-1)^2 + 1$



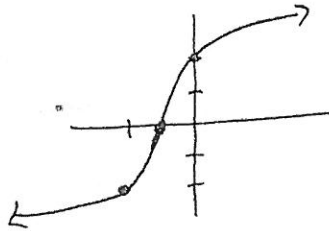
b. $f(x) = -2\sqrt{x+2}$



c. $f(x) = \frac{1}{4}x^3 - 1$

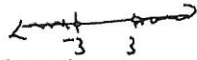


d. $f(x) = 2\sqrt[3]{x+1}$



7. Find the domain of $\sqrt{x^2-9}$.
 $(x-3)(x+3)$

$(-\infty, -3] \cup [3, \infty)$



8. Find $f(g(x))$ and its domain.

a. $f(x) = \frac{x+1}{x-2}$, $g(x) = \frac{1}{x}$

b. $f(x) = \sqrt{x-1}$, $g(x) = x+3$

$f(g(x)) = \frac{\frac{1}{x} + 1}{\frac{1}{x} - 2} \cdot \frac{x}{x}$

$f(g(x)) = \sqrt{x+3-1}$

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

$f(g(x)) = \frac{1+x}{1-2x}$ $D: x \neq 0, \frac{1}{2}$

$D: [-2, \infty)$

9. Find the equation for $f^{-1}(x)$:

a. $f(x) = 8x^3 + 1$

b. $f(x) = \frac{2}{x} + 5$

$x = 8y^3 + 1$

$x = \frac{2}{y} + 5$

$x-1 = 8y^3$

$x-5 = \frac{2}{y}$

$\frac{x-1}{8} = y^3$
 $\sqrt[3]{\frac{x-1}{8}} = y$

$f^{-1}(x) = \sqrt[3]{\frac{x-1}{8}}$

$y(x-5) = 2$

$y = \frac{2}{x-5}$

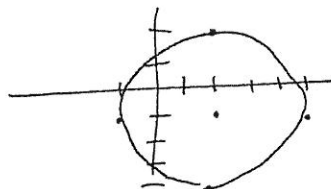
$f^{-1}(x) = \frac{2}{x-5}$

10. Write in completed square form, graph and give domain and range.

$x^2 + y^2 - 4x + 2y - 4 = 0$

$x^2 - 4x + 4 + y^2 + 2y + 1 = 4 + 4 + 1$

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



$D: [-1, 5]$

$R: [-4, 2]$