M121C Fall 2009 HW #2 Solutions

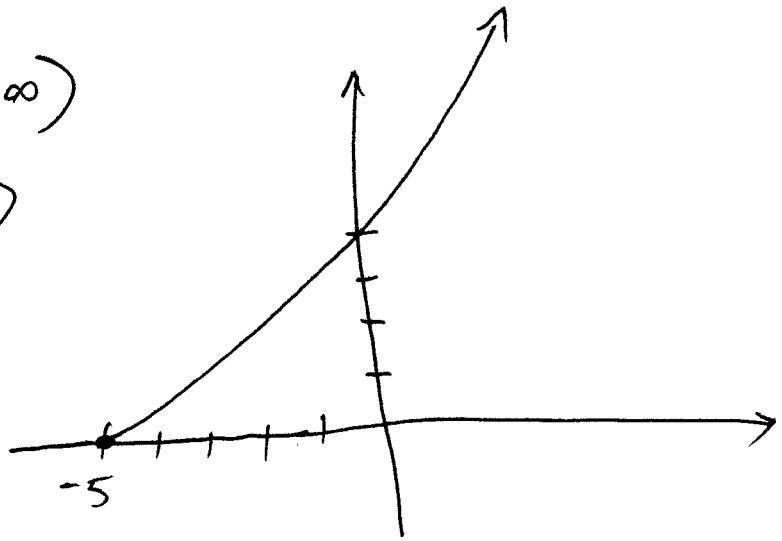
What got graded: §2.1 #38, 48, 62

§2.2 #14

(#38) Give the domain & range of the function w/ this graph

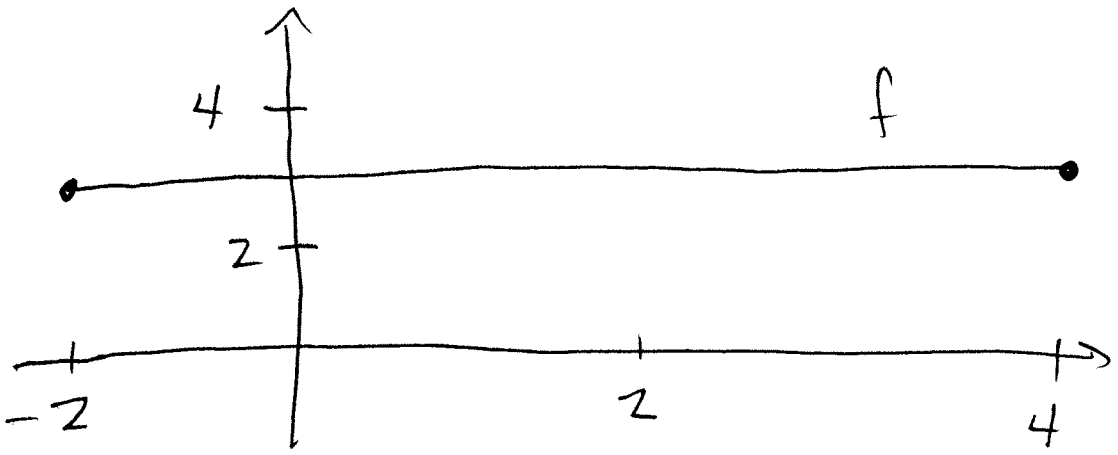
Ans: Domain = $[-5, \infty)$

Range = $[0, \infty)$



(48) Give the domain & range of the following graph, and find $f(-2)$, $f(0)$, $f(\frac{1}{2})$ and any values of x such that $f(x) = 1$.

↓



Domain: $-2 \leq x \leq 4$

Range: $3 = y$

$f(-2) = 3$, $f(0) = 3$, $f(\frac{1}{2}) = 3$

And there are <u>no</u> x values where $f(x) = 1$,

b/c $f(x)$ is <u>always</u> 3.

(62) $f(x) = x^2 - 3$. Find (a) $f(x+h)$, (b) $f(x+h) - f(x)$ and (c) $\left[f(x+h) - f(x)\right]/h$.

Solution: (a) $f(x+h) = (x+h)^2 - 3 = \boxed{x^2 + 2xh + h^2 - 3}$

(b) $f(x+h) - f(x) = x^2 + 2xh + h^2 - 3 - \left[x^2 - 3\right]$

$= \boxed{2xh + h^2}$

(c) $\left[f(x+h) - f(x)\right]/h = \dfrac{2xh + h^2}{h} = \boxed{2x + h}$

(14) Graph $f(x) = -x^2 + 6x - 6$ and find its vertex, x-intercepts, y-intercept.

Solution: vertex has x-coordinate

$$\frac{-6}{2(-1)} = 3 \quad \text{and y-coordinate}$$

$$f(3) = -3^2 + 6 \cdot 3 - 6 = 3$$

So (3,3) is the vertex.

The x-intercepts are the roots of the equation

$$-x^2+6x-6=0$$

$$x=\frac{-6\pm\sqrt{6^2-4\cdot(-1)\cdot(-6)}}{2(-1)}$$

$$=\frac{-6\pm\sqrt{36-24}}{-2}=\frac{-6\pm\sqrt{12}}{-2}$$

$$=\frac{-6\pm 2\sqrt{3}}{-2}=3\mp\sqrt{3}$$

$$=3+\sqrt{3} \text{ or } 3-\sqrt{3}$$

The y-intercept is

$$f(0)=-0^2+6\cdot 0-6=-6$$

The graph looks like