

**Math 111**  
**Exam 1 Answers**

1. (a)  $F(1) = \boxed{3}$

(b)  $\boxed{x = -2, x = 0, x \approx 3.6}$

(c)  $\frac{f(2)-f(-1)}{2-(-1)} = \frac{5-(-1)}{2+1} = \frac{6}{3} = \boxed{2}$

(d) Concave down  $\Rightarrow$  Bent downward

For this particular function, it looks it is concave down for  $\boxed{1 < x < 4 \text{ or } (1, 4)}$ .

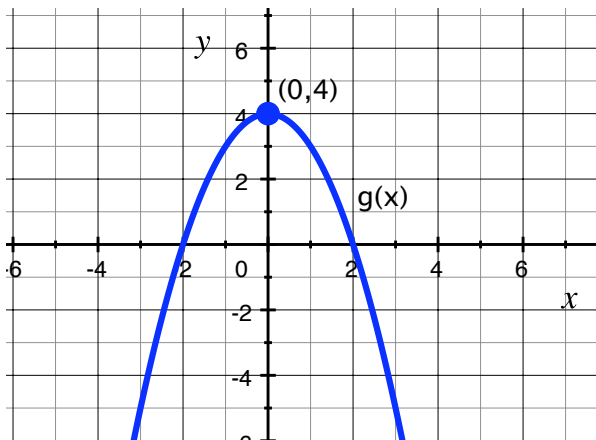
2. (a) The domain of  $f(x)$  is  $\boxed{x \neq 2}$ . (Must avoid division by 0.)

The domain of  $g(x)$  is  $\boxed{\text{all real numbers}}$ .

(b)  $f(9) = \frac{1}{7} \Rightarrow g(\frac{1}{7}) = 5(\frac{1}{7}) - 1 = \boxed{-\frac{2}{7}}$

(c)  $f(g(x)) = \frac{1}{5x-1-2} = \boxed{\frac{1}{5x-3}}$

3. This will give you the following parabola with a domain of  $\boxed{\text{all real numbers}}$  and a range of  $\boxed{y \leq 4 \text{ or } (-\infty, 4]}$ .



4.  $y = \begin{cases} 1 & \text{for } x \leq 1 \\ -2x + 4 & \text{for } x > 1 \end{cases}$

5. (a)  $h(1) = 32 \Rightarrow \boxed{\text{The ball is 32 feet high at 1 second.}}$

(b) Solve  $20 = -16t^2 + 48t \Rightarrow 0 = -16t^2 + 48t - 20$  by factoring into  $-4(2t-1)(2t-5)$   
or by using the quadratic formula.  $\Rightarrow \boxed{t = \frac{1}{2} \text{ seconds and } t = \frac{5}{2} \text{ seconds}}$

6. (a)  $f(1) = 9 \Rightarrow$  At 1 second, the velocity is 9 meters/second.

(b) Solving for  $t$ :  $t = \sqrt[3]{\frac{v-2}{7}}$  or  $t = (\frac{v-2}{7})^{1/3}$

(c) You can either plug  $v = 58$  into the formula from part (b) OR you can solve  $f(t) = 58$ .

Either way, you will get

$t = f^{-1}(58) = 2 \Rightarrow$  The squirrel has a velocity of 58 meters/second at a time of 2 seconds.