

Name:

Answer the questions in the spaces provided. Show all necessary work. If you have any questions, raise your hand and I will come try to answer.

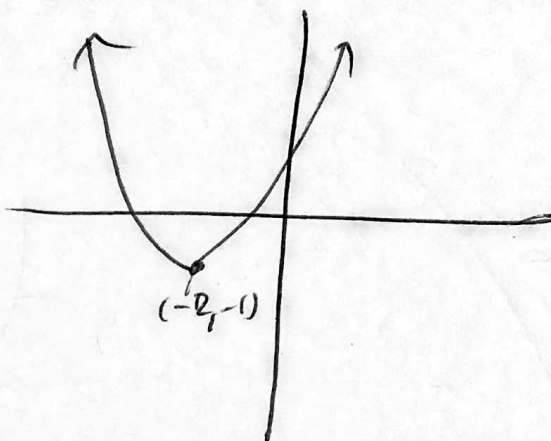
1. Consider the function $f(x) = x^2 + 4x + 3$.

(a) (5 points) Sketch a graph of $y = f(x)$.

Vertex

$$h = \frac{-b}{2a} = \frac{-4}{2} = -2$$

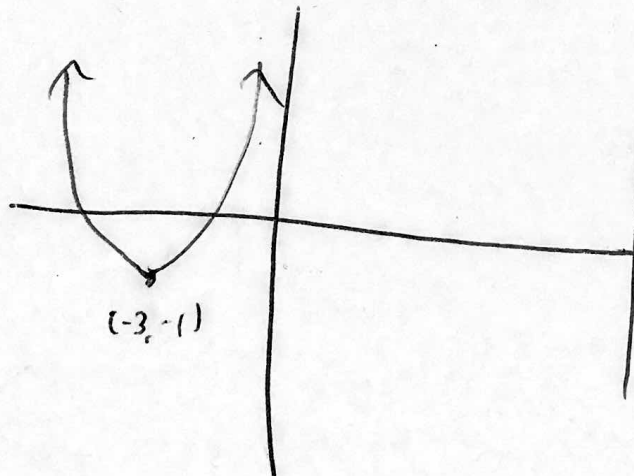
$$k = f(h) = 4 - 8 + 3 = -1$$



- (b) (5 points) Let $g(x) = x + 1$. Sketch graphs of $y = f \circ g(x)$ and $y = g \circ f(x)$ labelling the vertex of each. (HINT: Consider the composition as shifts).

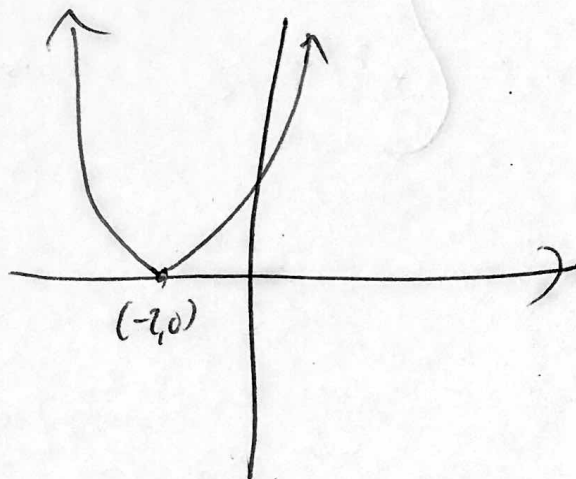
$$f \circ g(x) = f(x+1)$$

↑
Left 1



$$g \circ f(x) = f(x) + 1$$

↑ up 1



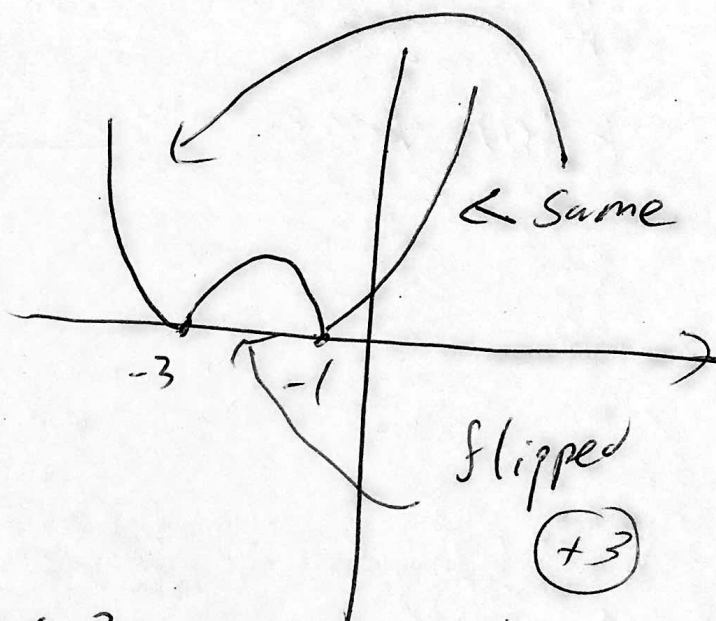
(c) (10 points) Sketch a graph of $y = |f(x)|$ (the absolute value of f) and write the associated multi part rule.

$$|f(x)| = \begin{cases} f(x) & f(x) \geq 0 \\ -f(x) & f(x) \leq 0 \end{cases}$$

(+1)

$$\begin{aligned} x^2 + 4x + 3 &= 0 \\ (x+3)(x+1) &= 0 \\ x &= -3 \text{ or } x = -1 \end{aligned}$$

(+2)



$$= \begin{cases} x^2 + 4x + 3 & x \leq -3 \\ -x^2 - 4x - 3 & -3 \leq x \leq -1 \\ x^2 + 4x + 3 & x \geq -1 \end{cases}$$

(+3)