

MATH 1720 - Functions Review - Answers

1. Use the function $f(x) = 3 - 4x - x^2$ to answer parts (a) through (e) below.

a. $f(3) = 3 - 4(3) - (3)^2 = 3 - 12 - 9 = -18$

b. $f(-2) = 3 - 4(-2) - (-2)^2 = 3 + 8 - 4 = 7$

c. $f(\frac{1}{2}) = 3 - 4(\frac{1}{2}) - (\frac{1}{2})^2 = 3 - 2 - \frac{1}{4} = \frac{3}{4}$

d. If $f(x) = -74$ then we solve the equation

$$3 - 4x - x^2 = -74$$

$$x^2 + 4x - 77 = 0$$

$$(x + 11)(x - 7) = 0$$

So that $x = -11$ or 7 .

e. We have

$$\begin{aligned} \frac{f(1+h) - f(1)}{h} &= \frac{[3 - 4(1+h) - (1+h)^2] - (3 - 4(1) - (1)^2)}{h} \\ &= \frac{[3 - 4 - 4h - (1 + 2h + h^2)] - (3 - 4 - 1)}{h} \\ &= \frac{-1 - 4h - 1 - 2h - h^2 - (-2)}{h} = \frac{-6h - h^2}{h} = \frac{-h(6+h)}{h} = -(6+h), h \neq 0 \end{aligned}$$

2. If $g(x) = 3x^2 + 2x - 1$ and $h(x) = 5x - 2$, then find and simplify

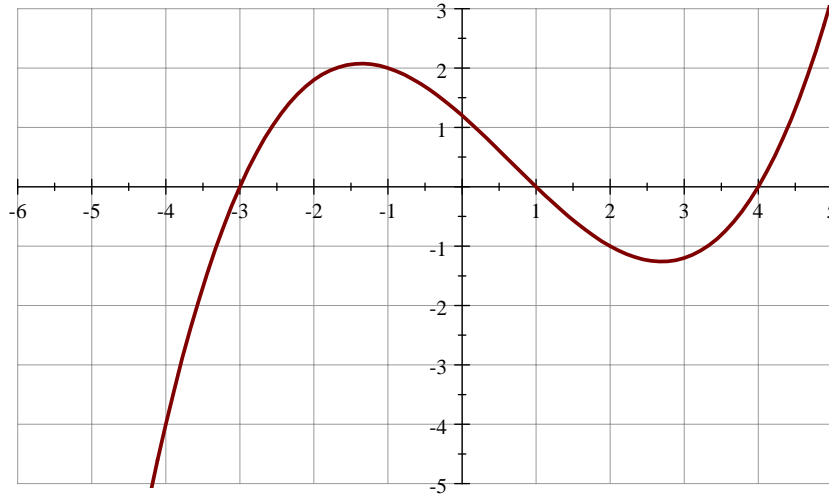
a.

$$\begin{aligned} (h \circ g)(x) &= h(g(x)) = h(3x^2 + 2x - 1) \\ &= 5(3x^2 + 2x - 1) - 2 = 15x^2 + 10x - 5 - 2 = 15x^2 + 10x - 7 \end{aligned}$$

b. We have

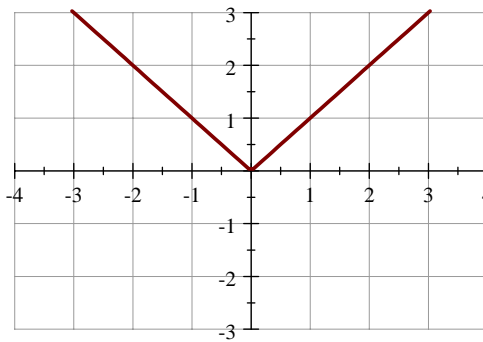
$$\begin{aligned} (g \circ h)(x) &= g(h(x)) = g(5x - 2) \\ &= 3(5x - 2)^2 + 2(5x - 2) - 1 \\ &= 3(25x^2 - 20x + 4) + 10x - 4 - 1 \\ &= 75x^2 - 60x + 12 + 10x - 5 = 75x^2 - 50x + 7 \end{aligned}$$

3. Use the graph of the function $p(x)$ shown below to estimate parts (a) through (e) below.

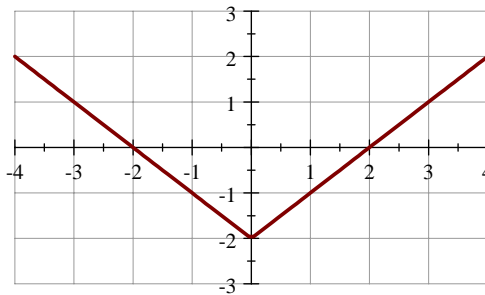


- a. $p(2) = -1$ b. $p(-1) = 2$ c. $p(-4) = -4$
- d. If $p(x) = 0$ then all possible values of x are -3 , 1 , and 4
- e. Over approximately what interval(s) is p increasing? $(-\infty, -1.4) \cup (2.7, \infty)$

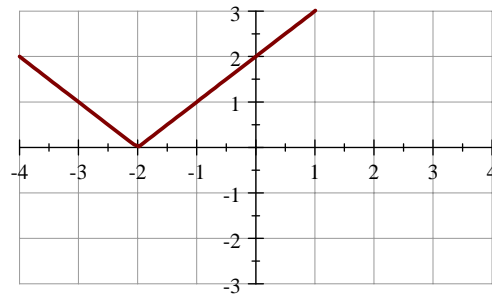
4. Use the graph of the function $m(x)$ shown below to sketch the related functions below.



Graph of $m(x)$



Sketch graph of $m(x) - 2$



Sketch graph of $m(x + 2)$