Questions From Homework

② a) $h(x) = f(x) \cdot g(x)$

$h(x) = (x-5)(2x+1)$

$h(x) = 2x^2 + x - 10x - 5$

$h(x) = 2x^2 - 9x - 5$

b) Parabola

c) $y = 2x^2 - 9x - 5$

$y + 5 = 2x^2 - 9x$

$-\frac{9}{2} \times \frac{1}{2} = \left(\frac{9}{4}\right)$

$= \frac{81}{16}$

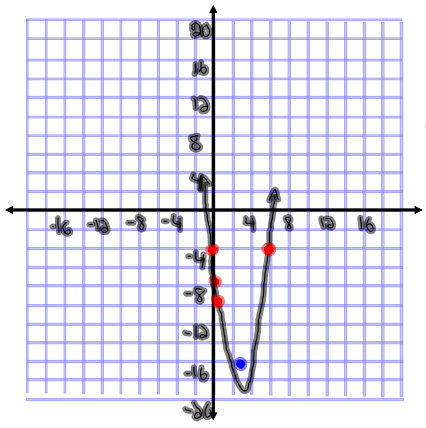
$y + 5 + \frac{81}{8} = 2\left(x^2 - \frac{9}{2}x + \frac{81}{16}\right)$

$y + \frac{40}{8} + \frac{81}{8} = 2\left(x - \frac{9}{4}\right)^2$

$y + \frac{121}{8} = 2\left(x - \frac{9}{4}\right)^2$

$y = 2\left(x - \frac{9}{4}\right)^2 - \frac{121}{8}$ Opens up

Vertex: $\left(\frac{9}{4}, -\frac{121}{8}\right) \rightarrow (2.25, -15.125)$



$y = 2x^2 - 9x - 5$

① y-int ($x=0$)

$y = 2(0)^2 - 9(0) - 5$

$y = -5$

$(0, -5)$

② x-int ($y=0$)

$0 = 2x^2 - 9x - 5$

$0 = (x-5)(2x+1)$

$x - 5 = 0$ | $2x + 1 = 0$

$x = 5$ | $2x = -1$

$x = -\frac{1}{2}$

Domain:

$\{x \mid x \in \mathbb{R}\}$

Range:

$\{y \mid y \geq -\frac{121}{8}, y \in \mathbb{R}\}$

$x^2 - 7x + 12$

$-3 \times -4 = 12$

$-3 + -4 = -7$

$(x-3)(x-4)$

$2x^2 - 9x - 5$

$-10 \times 1 = -10$

$-10 + 1 = -9$

$(2x^2 - 10x + x - 5)$

$2x(x-5) + 1(x-5)$

$(2x+1)(x-5)$

Composite Functions
Combining Functions in a Different Way!

$f(x) = x^2 + 3x$ $\qquad$ $g(x) = 2x + 1$

A new function *h(x)* is created when the domain of *g(x)* is restricted by the range of *f(x)*

$$h(x) = f(g(x))$$

$$= f(2x+1)$$

$$= (2x+1)^2 + 3(2x+1)$$

$$= 4x^2 + 4x + 1 + 6x + 3$$

$$= 4x^2 + 10x + 4$$

The notation "$f \circ g$" means the composition of *f with g* and is read "*f* composed with g."

$f(g(x))$

Composite Functions

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

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

$(g \circ g)x = g(g(x))$

Find

$(f \circ g)x$

$= f(g(x))$

$= f(3x-2)$

$= (3x-2)^2 + 5(3x-2) + 6$

$= 9x^2 - 12x + 4 + 15x - 10 + 6$

$= 9x^2 + 3x$

$(g \circ g)x$

$= g(g(x))$

$= g(3x-2)$

$= 3(3x-2) - 2$

$= 9x - 6 - 2$

$= 9x - 8$

$f(g(3))$

$g(3) = 3(3) - 2$

$= 9 - 2$

$= 7$

$f(7) = (7)^2 + 5(7) + 6$

$= 49 + 35 + 6$

$= 90$

$f(g(-2))$

$g(-2) = 3(-2) - 2$

$= -6 - 2$

$= -8$

$f(-8) = (-8)^2 + 5(-8) + 6$

$= 64 - 40 + 6$

$= 30$

$f(x) = x^2 + 5x + 6$

$g(x) = 3x - 2$

$g(f(-1))$

$g(g(4))$

$f(-1) = (-1)^2 + 5(-1) + 6$

$= 1 - 5 + 6$

$= 2$

$g(2) = 3(2) - 2$

$= 6 - 2$

$= 4$

$g(4) = 3(4) - 2$

$= 12 - 2$

$= 10$

$g(10) = 3(10) - 2$

$= 30 - 2$

$= 28$

Homework

① $f(x) = 3x - 5$ $g(x) = 2 - 5x - x^2$

a) $g(f(x))$

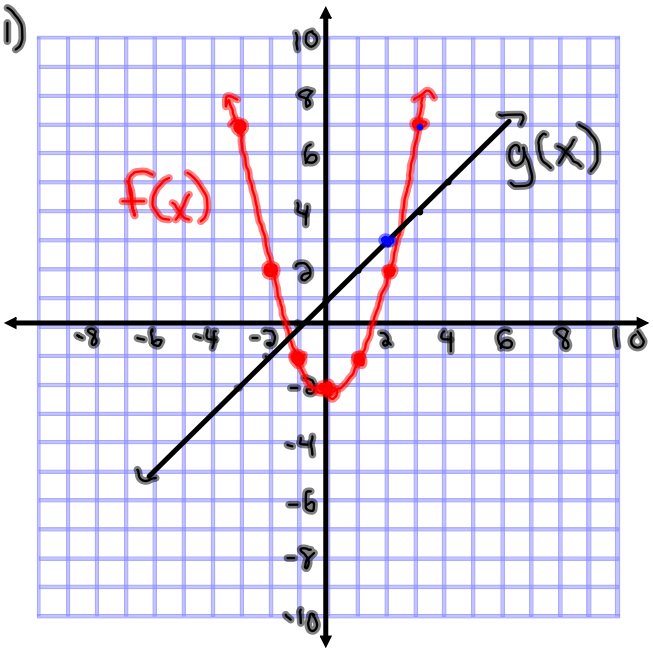
$g(3x-5) = 2 - 5(3x-5) - (3x-5)^2$

$= 2 - 15x + 25 - (9x^2 - 30x + 25)$

$= 2 - 15x + 25 - 9x^2 + 30x - 25$

$= -9x^2 + 15x + 2$

(i)



a) $f(g(2))$

(i) $f(g(2))$

$= f(3)$

$= 7$

⑧

x	p(x)
-3	-7
-1	-3
0	-1
1	3
3	4
5	0

x	q(x)
-4	8
-2	5
0	1
2	-4
4	-7
6	-11

a) $p(q(-2))$

$= p(5)$

$= 0$