

Student Name: KEY

Show all relevant work (use back of pages for scratch paper, if needed). **CIRCLE FINAL ANSWERS.**
 Leave answers exact (not decimals from a calculator). Each problem is worth 7 points.

1. Let $f(x) = \frac{x+5}{\sqrt{x-3}}$.

(a) What is the domain of f ?

$$\{x \mid x > 3\}$$

*x may be any
number greater
than 3.*

$$(3, +\infty)$$

(b) Evaluate $f(12)$.

$$f(12) = \frac{12+5}{\sqrt{12-3}} = \frac{17}{\sqrt{9}} = \boxed{\frac{17}{3}}$$

2. Given function $d(t) = 2t^3 - 1$ between $t = -2$ and $t = 3$,

(a) what is the net change of d ?

$$\begin{aligned} d(3) - d(-2) &= (2(3)^3 - 1) - (2(-2)^3 - 1) = (2(27) - 1) - (2(-8) - 1) \\ &= (54 - 1) - (-16 - 1) = 53 - (-17) = \boxed{70} \end{aligned}$$

(b) what is the average rate of change of d ?

$$\frac{d(3) - d(-2)}{3 - (-2)} = \frac{70}{3+2} = \frac{70}{5} = \boxed{14}$$

3. Let $f(x) = \begin{cases} 1 - 4x^2 & \text{if } x \leq 5 \\ x + 7 & \text{if } x > 5 \end{cases}$

(a) Evaluate $f(6)$.

$$f(6) = 6 + 7 = \boxed{13}$$

(b) Evaluate $f(-7)$.

$$f(-7) = 1 - 4(-7)^2 = 1 - 4(49) = \boxed{-195}$$

4. A function g is described in words as: "Add 2 to the number, take the square root, then subtract 4."

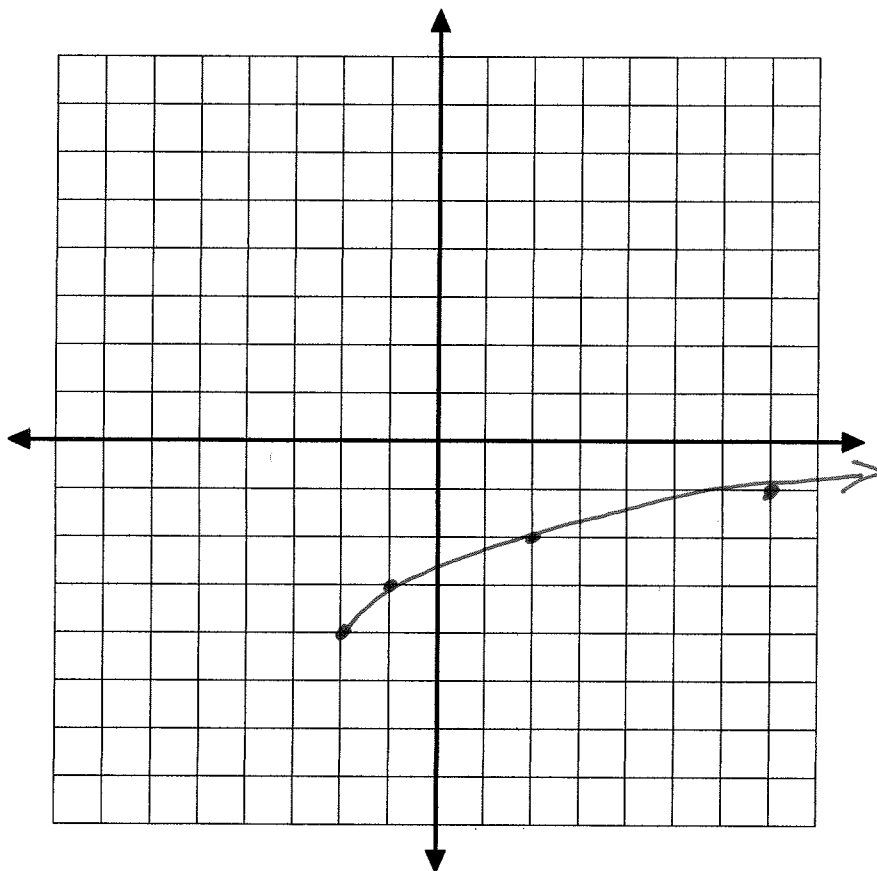
(a) Express function g algebraically.

$$g(x) = \sqrt{x+2} - 4$$

(b) Complete the chart of values for g :

x	$g(x)$
-2	-4
-1	-3
2	-2
7	-1

(c) Plot the points and sketch the graph of g using the table from (b) as a guide.



5. If $f(x) = 3x + 2$ and $g(x) = 1 - 2x^2$, find the following, and simplify :

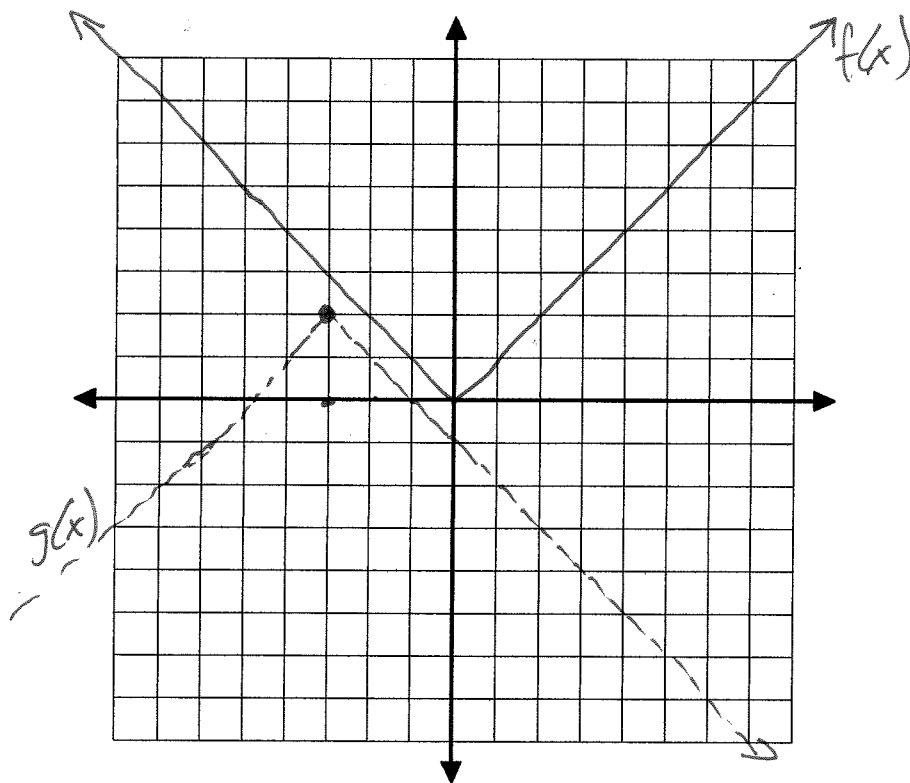
$$(a) \quad (g-f)(2) = g(2) - f(2) = (1 - 2(2)^2) - (3(2) + 2) = \\ = (1 - 2(4)) - (6 + 2) = (1 - 8) - (8) = 1 - 8 - 8 = \boxed{-15}$$

$$(b) \quad (f+g)(a) = f(a) + g(a) = (3a + 2) + (1 - 2a^2) = \boxed{-2a^2 + 3a + 3}$$

$$(c) \quad (f \circ f)(3) = f(f(3)) = f(3(3) + 2) = f(9 + 2) = f(11) = \\ 3(11) + 2 = 33 + 2 = \boxed{35}$$

$$(d) \quad f(g(5)) = f(1 - 2(5)^2) = f(1 - 2(25)) = f(1 - 50) = f(-49) \\ = 3(-49) + 2 = \boxed{-145}$$

6. [7pts, each graph] On the grid below sketch the graph of $f(x) = |x|$. Then, sketch the graph of $g(x) = -|x+3| + 2$. You may plot points by hand or use knowledge of transformations. Please label each graph drawn.



$g(x)$
 1. left 3
 2. flip vertically
 3. up 2