

Student Name: KEY

Show all relevant work (use back of pages for scratch paper, if needed). **CIRCLE FINAL ANSWERS.** Leave answers as fractions, not decimals. Each question is worth 7 points.

1. Let $f(x) = \frac{\sqrt{4-x}}{2x+3}$. $x \leq 4$
 $x \neq -\frac{3}{2}$

(a) What is the domain of f ? $\{x \mid x \leq 4, x \neq -\frac{3}{2}\}$ or $(-\infty, -\frac{3}{2}) \cup (-\frac{3}{2}, 4]$

(b) Evaluate $f(-5)$.

$$f(-5) = \frac{\sqrt{4-(-5)}}{2(-5)+3} = \frac{\sqrt{9}}{-10+3} = \frac{3}{-7} = \boxed{-\frac{3}{7}}$$

2. Let $f(x) = \begin{cases} 2-x & \text{if } x \leq 0 \\ x^2+8 & \text{if } x > 0 \end{cases}$

(a) Evaluate $f(7)$.

$$f(7) = 7^2 + 8 = 49 + 8 = \boxed{57}$$

(b) Evaluate $f(-2)$.

$$f(-2) = 2 - (-2) = 2 + 2 = \boxed{4}$$

3. For the function $h(z) = 9 + z^3$ on the interval from $z = -1$ and $z = 2$,

(a) what is the net change?

$$h(2) - h(-1) = (9 + 2^3) - (9 + (-1)^3) = (9 + 8) - (9 - 1) = 17 - 8 = \boxed{9}$$

(b) what is the average rate of change?

$$\frac{h(2) - h(-1)}{2 - (-1)} = \frac{9}{3} = \boxed{3}$$

4. A function g is described in words as: "Add 1 to the number, then take the square root."

(a) Express function g algebraically.

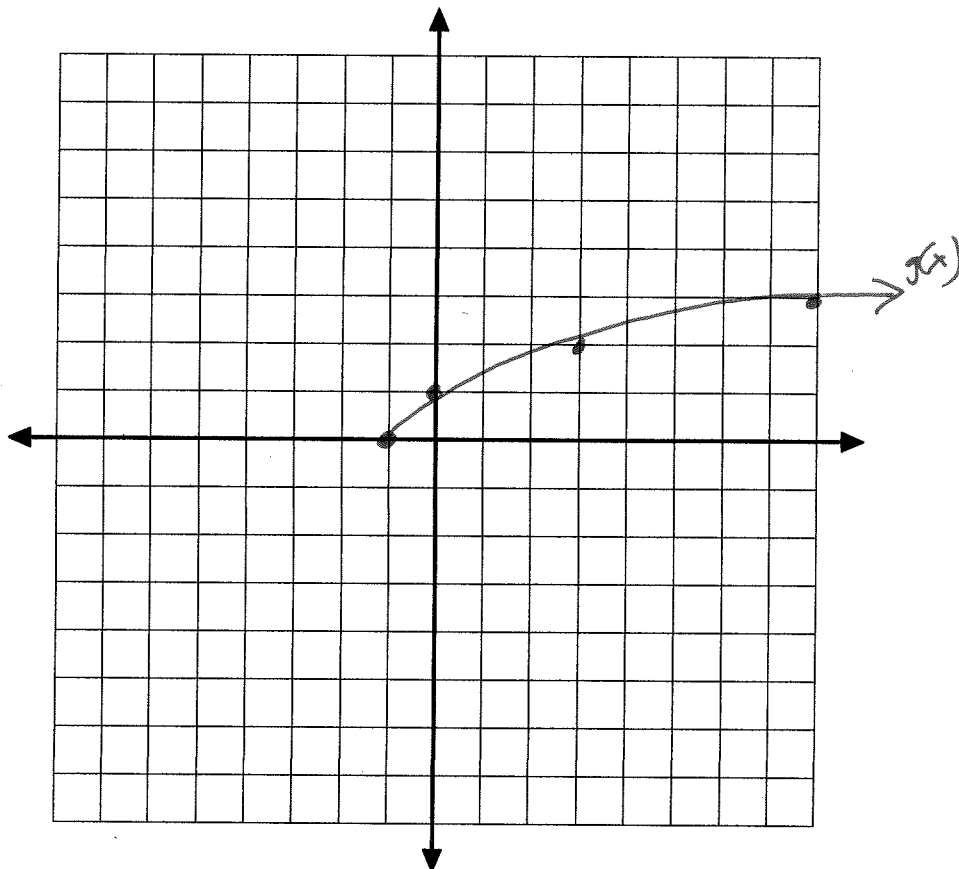
$$g(x) = \sqrt{x+1}$$

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(b) Complete the chart of values for g :

x	$g(x)$
-1	0
0	1
1	$\sqrt{2} \approx 1.4$
3	$\sqrt{4} = 2$
8	$\sqrt{9} = 3$

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



5. If $f(x) = x^2 - 5$ and $g(x) = 3x + 6$, find the following :

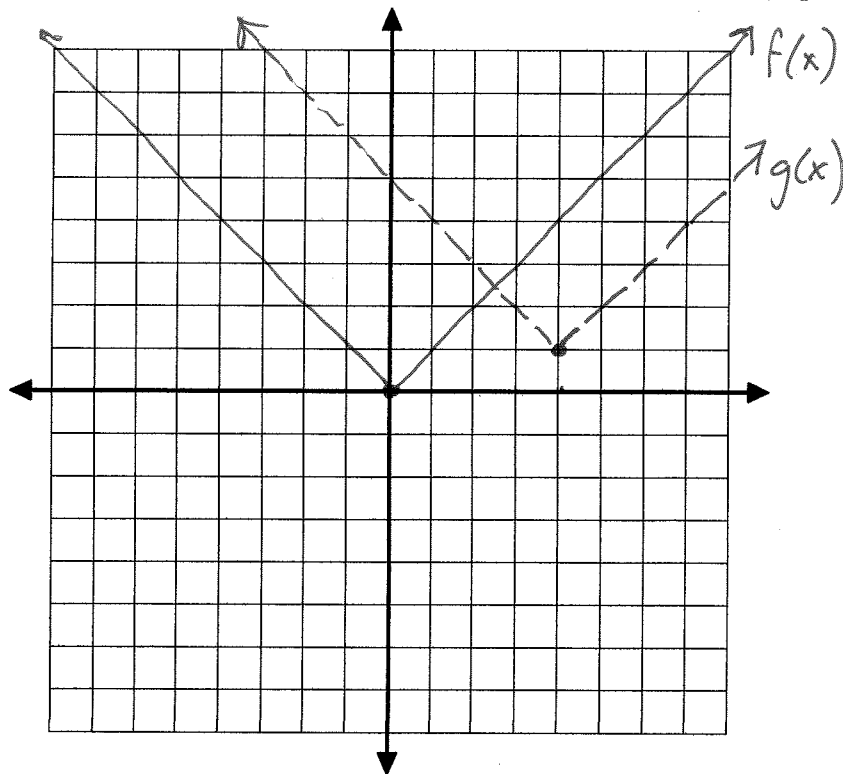
$$(a) (f+g)(8) = f(8) + g(8) = (8^2 - 5) + (3(8) + 6) \\ = (64 - 5) + (24 + 6) = 59 + 30 = \boxed{89}$$

$$(b) (g \circ f)(x) = g(f(x)) = g(x^2 - 5) = 3(x^2 - 5) + 6 \\ = 3x^2 - 15 + 6 = \boxed{3x^2 - 9} = 3(x^2 - 3)$$

$$(c) (g - f)(x) = g(x) - f(x) = 3x + 6 - (x^2 - 5) = \boxed{-x^2 + 3x + 11}$$

$$(d) (fg)(2) = f(2)g(2) = (2^2 - 5)(3(2) + 6) = (4 - 5)(6 + 6) \\ = (-1)(12) = \boxed{-12}$$

6. On the grid below sketch the graph of $f(x) = |x|$. Then, sketch the graph of $g(x) = |x - 4| + 1$. You may plot points by hand or use knowledge of transformations. Please label each graph drawn. [7pts, each graph]



$g(x)$
 1. right 4
 2. ~~right~~ up 1