

Name: _____

Student #: _____

Date: _____

T.A. #: _____

Mathematics 12 Pre-Calculus
LEARNING GUIDE 17 TEST – FUNCTION OPERATIONS

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***Full marks will NOT be given for the final answer only.**

When using a calculator, you should provide a decimal answer that is correct **to at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

1. If $f(x) = 1 - 3x$ and $g(x) = x^2 + 1$, determine $h(x) = f(x) + g(x)$ and find $h(1)$. (2 marks)

$$\begin{aligned} h(x) &= 1 - 3x + x^2 + 1 \\ &= x^2 - 3x + 2 \end{aligned}$$

$$\begin{aligned} h(1) &= 1 - 3 + 2 \\ &= 0 \end{aligned}$$

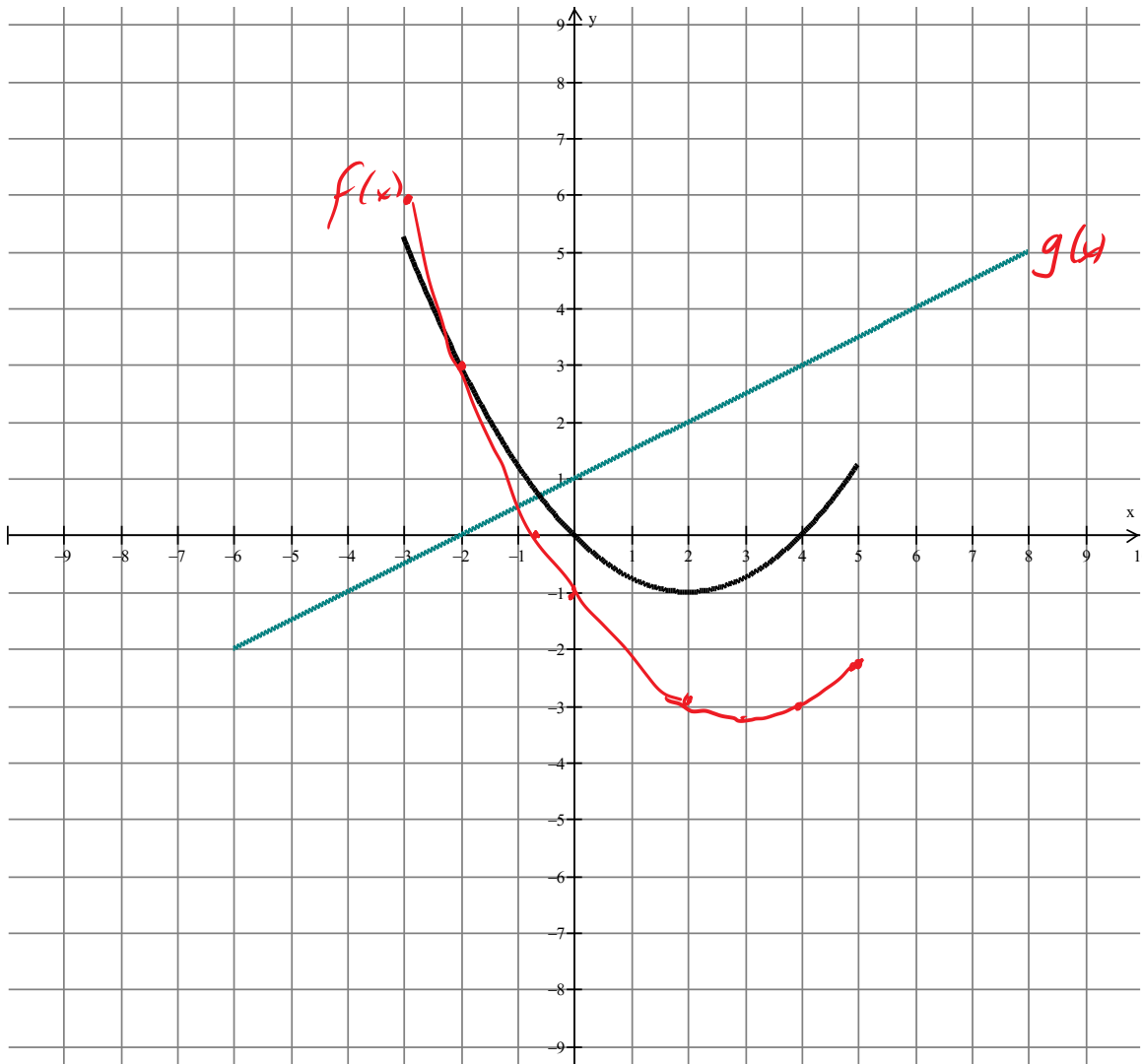
2. If $f(x) = 2x - 3$ and $g(x) = -5x$ determine the function $h(x) = \left(\frac{f}{g}\right)(x)$ and determine the range of $h(x)$. (2 marks)

$$h(x) = \frac{2x-3}{-5x}$$

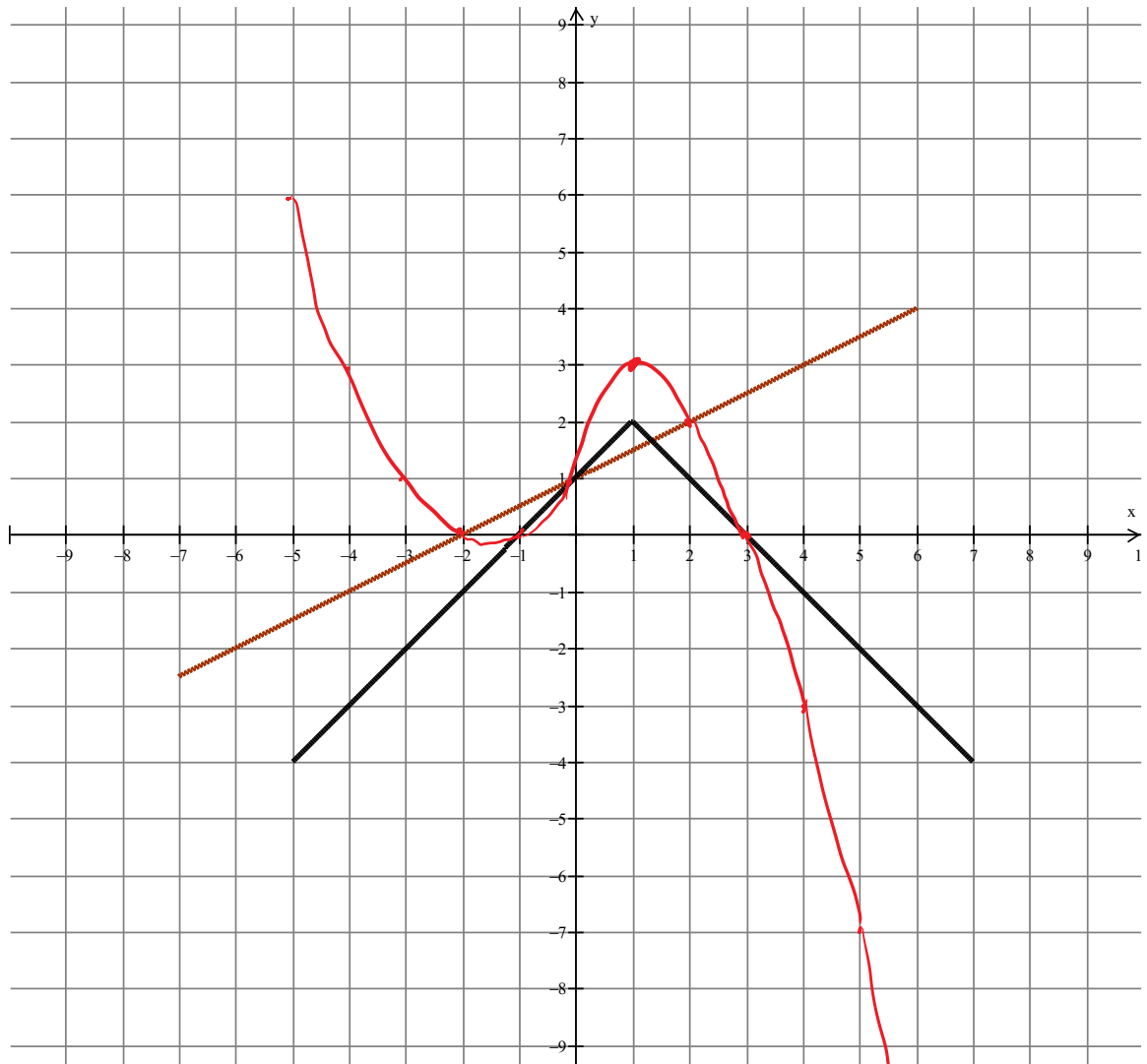
$$\text{Range: } y \neq -\frac{2}{5}$$

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3. Given the graphs of $y = f(x)$ and $y = g(x)$, sketch the graph of $y = f(x) - g(x)$.
(2 marks)



4. Given the functions $y = f(x)$ and $y = g(x)$, determine $(f \cdot g)(2)$ and determine the domain and range of the function $(f \cdot g)(x)$. (3 marks)



$$f \cdot g(2) = (1)(2) = 2$$

$$\text{Domain: } -5 \leq x \leq 6$$

$$\text{Range: } -12 \leq y \leq 6$$

5. If $f(x) = 1 - x^2$ and $g(x) = 3x$, determine: (1 mark each)

a) $f(g(x))$

$$f(g(x)) = 1 - (3x)^2 = \boxed{1 - 9x^2}$$

b) $g(f(1))$

$$f(1) = 0 \quad g(0) = 3(0) = \boxed{0}$$

c) $g(g(x))$

$$g(g(x)) = 3(3x) = \boxed{9x}$$

6. The revenue function for a company selling n key chains is given by $R(n) = 2n$, and the total cost function is given by $C(n) = 100 + 0.80n$. Determine the simplified equation for $P(n)$, the profit function for the company. (2 marks)

$$\begin{aligned} P(n) &= R(n) - C(n) \\ &= 2n - (100 + 0.8n) \\ &= 1.2n - 100 \end{aligned}$$

7. Brenda is shopping for new shoes. All items are 25% off. She also has a \$15 off coupon.

a) Let x represent the regular price of the shoes. Express the price, d , of the shoes after the 25% discount.

(1 mark)

$$d = .75x$$

b) Let x represent the regular price of the shoes. Express the price, c , of the shoes after the \$15 off coupon.

(1 mark)

$$c = x - 15$$

c) Determine $c(d(x))$ and $d(c(x))$ and explain what each value means. (1 mark)

$$c(d(x)) = .75x - 15$$

THE SELLING PRICE WITH 25% OFF FIRST THEN THE \$15 OFF COUPON.

$$d(c(x)) = .75(x - 15)$$

THE \$15 off coupon is THEN 25% off

d) If the regular price of the shoes cost \$90, which method results in the better deal? (1 mark)

$$c(d(x)) = .75(90) - 15 = \$52.50$$

← BETTER DEAL!

$$d(c(x)) = .75(90 - 15) = \$56.25$$