

Use the following functions for problems 1-8:

$$f(x) = \frac{1}{2}x - 2, \quad g(x) = 2x^2 - 3x + 5, \quad h(x) = -|x + 2| - 3$$

Evaluate each function.

1. $f(2)$

$$f(2) = \frac{1}{2}(2) - 2$$

$$= 1 - 2$$

$$= \boxed{-1}$$

2. $g(0)$

$$g(0) = 2(0)^2 - 3(0) + 5$$

$$= 0 - 0 + 5$$

$$= \boxed{5}$$

3. $h(4)$

$$h(4) = -|4 + 2| - 3$$

$$= -|6| - 3$$

$$= -6 - 3 = \boxed{-9}$$

4. $g(-1)$

$$g(-1) = 2(-1)^2 - 3(-1) + 5$$

$$= 2 + 3 + 5$$

$$= \boxed{10}$$

5. $h(-8)$

$$h(-8) = -|-8 + 2| - 3$$

$$= -|-6| - 3$$

$$= -6 - 3$$

$$= \boxed{-9}$$

6. $f\left(\frac{2}{3}\right)$

$$f\left(\frac{2}{3}\right) = \frac{1}{2}\left(\frac{2}{3}\right) - 2$$

$$= \frac{2}{6} - 2$$

$$= \frac{1}{3} - \frac{6}{3} = \boxed{-\frac{5}{3}}$$

Given $f(x) = 2x + 5$ and $g(x) = 3x - 2$, simplify the expressions:

7. $(f + g)(x)$

$$2x + 5 + 3x - 2$$

$$5x + 3$$

8. $(f - g)(x)$

$$2x + 5 - (3x - 2)$$

$$-x + 7$$

9. $(fg)(x)$

$$(2x + 5)(3x - 2)$$

$$6x^2 - 4x + 15x - 10$$

$$6x^2 + 11x - 10$$

10. $(f + g)(2)$

$$5(2) + 3$$

$$10 + 3$$

$$= \boxed{13}$$

11. $(f - g)(0)$

$$-(0) + 7$$

$$= \boxed{7}$$

12. $(fg)(3)$

$$6(3)^2 + 11(3) - 10$$

$$6(9) + 33 - 10$$

$$54 + 23$$

$$= \boxed{77}$$

Given $f(x) = 12x + 10$, $g(x) = 3x + 28$, $v(x) = \frac{4x-6}{3}$, and $d(x) = 24$ answer the following questions.

13. For what value of x is $f(x) = g(x)$

$$12x + 10 = 3x + 28$$

$$-3x \quad -10 \quad -3x \quad -10$$

$$9x = 18$$

$$\boxed{x = 2}$$

$$\frac{4x - 6}{3} = (24)3$$

$$4x - 6 = 72$$

$$+6 \quad +6$$

$$\frac{4x}{4} = \frac{78}{4}$$

$$\boxed{x = 19.5}$$

Given the following functions, answer questions 15-29.

$f(x) = 3x - 4$	$g(x) = 5 + 7i$	$h(x) = 2 - i$	$j(x) = 6x^3 + 2x^2$
$k(x) = 5x^3 - 12x^2 + 6$	$m(x) = 4x^{\frac{2}{3}}$	$n(x) = -7x^{\frac{2}{3}}$	$p(x) = 12x^{\frac{1}{4}}$
$q(x) = x^{\frac{1}{2}}$	$r(x) = \sqrt[3]{x}$	$t(x) = 8\sqrt[3]{x}$	$w(x) = -3 - 6i$
$y(x) = 10x^{\frac{5}{4}}$	$z(x) = 3x^{\frac{2}{3}}$	$a(x) = -4 + 3i$	$b(x) = 2x + 7$

<p>15. $f(-3) + j(2)$ $(3(-3) - 4) + (6(2)^3 + 2(2)^2)$ $(-9 - 4) + (6 \cdot 8 + 2 \cdot 4)$ $= -13 + 48 + 8$ $= 43$</p>	<p>16. $g(x) - h(x)$ $5 + 7i - (2 - i)$ $3 + 8i$</p>	<p>17. $6 + g(x) + 2h(x)$ $6 + (5 + 7i) + 2(2 - i)$ $6 + 5 + 7i + 4 - 2i$ $15 + 5i$</p>
<p>18. $m(x) - n(x)$ $4x^{\frac{2}{3}} - (-7x^{\frac{2}{3}})$ $11x^{\frac{2}{3}}$</p>	<p>19. $\frac{p(x)}{m(x)} = \frac{12x^{\frac{1}{4}}}{4x^{\frac{2}{3}}} = \frac{12x^{\frac{1}{12}}}{4x^{\frac{1}{2}}}$ $3x^{-\frac{5}{12}} \text{ or } \frac{3}{x^{\frac{5}{12}}}$</p>	<p>20. $\frac{g(x)}{h(x)}$ SKIP</p>
<p>21. $q(9) + r(8)$ $9^{\frac{1}{2}} + \sqrt[3]{8}$ $3 + 2$ 5</p>	<p>22. $r(x) - t(x)$ $\sqrt[3]{x} - 8\sqrt[3]{x}$ $-7\sqrt[3]{x}$</p>	<p>23. $h(x) \cdot w(x)$ $(2 - i)(-3 - 6i)$ $-6 - 12i + 3i + 6i^2$ $-6 - 9i + 6(-1)$ $-12 - 9i$</p>
<p>24. $(f(x))^2$ $(3x - 4)(3x - 4)$ $9x^2 - 12x - 12x + 16$ $9x^2 - 24x + 16$</p>	<p>25. $\frac{h(x)}{a(x)}$ SKIP</p>	<p>26. $[q(x)]^{\frac{2}{3}} + t(x)$ $(x^{\frac{1}{2}})^{\frac{2}{3}} + 8\sqrt[3]{x}$ $x^{\frac{2}{6}} + 8x^{\frac{1}{3}}$ $= x^{\frac{1}{3}} + 8x^{\frac{1}{3}} = 9x^{\frac{1}{3}}$</p>

Application:

27. A company estimates that its cost and revenue can be modeled by the functions $C(x) = 0.75x^2 + 100x + 20,000$ and $R(x) = 1.25x^2 + 350x + 23,700$, where x is the number of units produced.

- a) Write the equation, $P(x)$, that would model the company's profit. (Hint: profit = revenue - cost)
 b) What would be the profit if the company only sold 10 units?
 c) What would be the profit if the company sold 200 units?

a) $P(x) = (1.25x^2 + 350x + 23,700) - (0.75x^2 + 100x + 20,000)$

$P(x) = 0.5x^2 + 250x + 3700$

b) $p(10) = 16,250$

c) $p(200) = 173,700$