

Here are the functions we will use:

$$f(x) = 3x^2 + 5x - 4$$

$$g(x) = 5x^2 - 2x + 7$$

$$h(x) = 7x$$

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

$$m(x) = 3x - 4$$

$$p(x) = x^{\frac{1}{2}}$$

$$q(x) = 6x^{\frac{5}{3}}$$

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

Example Set 1: Evaluate the following

<p>a. $f(2)$</p> $f(2) = 3(2)^2 + 5(2) - 4$ $= 3(4) + 10 - 4$ $= 12 + 6$ $= \boxed{18}$	<p>b. $-4k(3)$</p> $k(3) = 2(3) + 1$ $= 6 + 1$ $= 7$ $-4(k(3)) = -4 \cdot 7$ $= \boxed{-28}$	<p>c. $w(0) - p(4)$</p> $w(0) = 2(0)^2 - 3$ $w(0) = -3$ $p(4) = 4^{\frac{1}{2}} = 2$ $p(4) = 2$ $-3 - 2 = \boxed{-5}$
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Example Set 2: Perform each operation. Answers should be written in simplified form.

<p>a. $f(x) - m(x)$</p> $3x^2 + 5x - 4 - (3x - 4)$ $3x^2 + 5x - 4 - 3x + 4$ $\boxed{3x^2 + 2x}$	<p>b. $(g+m)(x) = g(x) + m(x)$</p> $5x^2 - 2x + 7 + (3x - 4)$ $5x^2 - 2x + 7 + 3x - 4$ $\boxed{5x^2 + x + 3}$	<p>c. $(km)(x) = k(x) \cdot m(x)$</p> $(2x+1)(3x-4)$ $6x^2 - 8x + 3x - 4$ $\boxed{6x^2 - 5x - 4}$
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Example Set 3: Combining with complex numbers and exponents.

<p>a. Let $f(x) = 4 - i$ and $g(x) = 3 - 2i$</p> <p>Find $f(x) + g(x)$</p> $4 - i + 3 - 2i$ $\boxed{7 - 3i}$ <p>Find $g(x) \cdot f(x)$</p> $(3 - 2i)(4 - i)$ $12 - 3i - 8i + 2i^2$ $= 12 - 11i + 2(-1)$ $= \boxed{10 - 11i}$	<p>b. Let $f(x) = 2x^{4/5}$ and $g(x) = -5x^{1/2}$</p> <p>Find $f(x) \cdot g(x)$</p> $2x^{\frac{4}{5}} \cdot -5x^{\frac{1}{2}}$ $= 2x^{\frac{8}{10}} \cdot -5x^{\frac{5}{10}} = \boxed{-10x^{\frac{13}{10}}}$ <p>Find $\frac{f(x)}{g(x)}$</p> $\frac{2x^{\frac{4}{5}}}{-5x^{\frac{1}{2}}} = \frac{2x^{\frac{8}{10}}}{-5x^{\frac{5}{10}}}$ $= \boxed{-\frac{2x^3}{5}}$
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Practice Problems: Use the following functions to answer the following questions.

$$f(x) = 3x^2 + 5x - 4$$

$$g(x) = 5x^2 - 2x + 7$$

$$h(x) = 7x$$

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

$$m(x) = 3x - 4$$

$$p(x) = x^{\frac{1}{2}}$$

$$q(x) = 6x^{\frac{5}{3}}$$

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

<p>a. $h(x) \cdot k(x)$</p> $7x \cdot (2x + 1)$ $= \boxed{14x^2 + 7x}$	<p>b. $[k(x)]^2$</p> $(2x + 1)^2$ $(2x + 1)(2x + 1)$ $\boxed{4x^2 + 4x + 1}$	<p>c. $f(x) + g(x)$</p> $3x^2 + 5x - 4 + 5x^2 - 2x + 7$ $\boxed{8x^2 + 3x + 3}$	<p>d. $q(x)p(x)$</p> $6x^{\frac{5}{3}} \cdot x^{\frac{1}{2}}$ $= 6x^{\frac{10}{6}} \cdot x^{\frac{3}{6}}$ $\boxed{6x^{13/6}}$
<p>e. $f(x) - m(x)$</p> $3x^2 + 5x - 4 - (3x - 4)$ $3x^2 + 5x - 4 - 3x + 4$ $\boxed{3x^2 + 2x}$	<p>f. $(gh)(x) = g(x) \cdot h(x)$</p> $(5x^2 - 2x + 7)(7x)$ $\boxed{35x^3 - 14x^2 + 49x}$	<p>g. $m(x)m(x)$</p> $(3x - 4)(3x - 4)$ $\boxed{9x^2 - 24x + 16}$	<p>h. $w(x) - w(x)$</p> 0
<p>i. $(wh)(x)$</p> $(2x^2 - 3)(7x)$ $\boxed{14x^2 - 21x}$	<p>j. $(g+m)(x)$</p> $5x^2 - 2x + 7 + 3x - 4$ $\boxed{5x^2 + x + 3}$	<p>k. $f(x)k(x)$</p> $(3x^2 + 5x - 4)(2x + 1)$ $6x^3 + 3x^2 + 10x^2 + 5x - 8x - 4$ $\boxed{6x^3 + 13x^2 - 3x - 4}$	<p>l. $(p \cdot q)(x)$</p> $x^{\frac{1}{2}} \cdot 6x^{\frac{5}{3}}$ $= x^{\frac{3}{6}} \cdot 6x^{\frac{10}{6}}$ $\boxed{6x^{13/6}}$
<p>m. $f(x) + f(x)$</p> $3x^2 + 5x - 4 + 3x^2 + 5x - 4$ $\boxed{6x^2 + 10x - 8}$	<p>n. $m(x) \cdot k(x)$</p> $(3x - 4)(2x + 1)$ $6x^2 + 3x - 8x - 4$ $\boxed{6x^2 - 5x - 4}$	<p>o. $(h - k)(x)$</p> $7x - (2x + 1)$ $7x - 2x - 1$ $\boxed{5x - 1}$	<p>p. $p(x) \cdot k(x)$</p> $x^{\frac{1}{2}}(2x + 1)$ $x^{\frac{1}{2}}(2x^{\frac{3}{2}} + 1x^0)$ $2x^{\frac{3}{2}} + 1x^{\frac{1}{2}}$ $\boxed{2x^{\frac{3}{2}} + x^{\frac{1}{2}}}$