

Bellwork Alg 2 Wednesday, February 12, 2020

For each composite simplify as much as possible.

1. Given: $f(x) = 2x - 13$ $g(x) = x^2 + 3x - 7$

- a) Find $f(g(x))$. b) Find $(g \circ f)(x)$ c) Find $g(f(-5))$

2. Given: $f(x) = 2x - 5$ $g(x) = \frac{4x}{3x + 2}$

- a) Find $g(f(x))$. b) Find $(f \circ g)(x)$ c) Find $f(g(2))$

3. Rationalize each denominator. Simplify answer if possible.

a) $\frac{36ab^2}{\sqrt[3]{36a^7b^{14}}}$

b) $\frac{21}{9 - \sqrt{6}}$

4. Simplify. Rationalize denominator as needed. $\frac{\sqrt{21d^5e^{16}}}{\sqrt{48d^{19}e^3}}$

ANSWERS

For each composite simplify as much as possible.

1. Given: $f(x) = 2x - 13$ $g(x) = x^2 + 3x - 7$

a) Find $f(g(x))$.

$$= 2(x^2 + 3x - 7) - 13$$

$$= 2x^2 + 6x - 14 - 13$$

$$= \boxed{2x^2 + 6x - 27}$$

b) Find $(g \circ f)(x)$

$$(2x - 13)^2 + 3(2x - 13) - 7$$

$$\begin{array}{r} 2x - 13 \\ 2x \quad \begin{array}{|c|c|} \hline 4x^2 & -26x \\ \hline \end{array} \\ -13 \quad \begin{array}{|c|c|} \hline -26x & +169 \\ \hline \end{array} \end{array}$$

$$= 4x^2 - 52x + 169 + 6x - 39 - 7$$

$$= \boxed{4x^2 - 46x + 123}$$

c) Find $g(f(-5))$

$$f(-5) = 2(-5) - 13 = -10 - 13 = -23$$

$$g(f(-5)) = g(-23)$$

$$= (-23)^2 + 3(-23) - 7$$

$$= 529 - 69 - 7$$

$$= \boxed{453}$$

2. Given: $f(x) = 2x - 5$

$$g(x) = \frac{4x}{3x + 2}$$

a) Find $g(f(x))$.

$$\frac{4(2x - 5)}{3(2x - 5) + 2}$$

$$= \frac{8x - 20}{6x - 15 + 2}$$

$$= \boxed{\frac{8x - 20}{6x - 13}}$$

b) Find $(f \circ g)(x)$

$$2\left(\frac{4x}{3x + 2}\right) - 5$$

$$= \frac{8x}{3x + 2} - 5 \cdot \frac{3x + 2}{3x + 2}$$

$$= \frac{8x - 15x - 10}{3x + 2}$$

$$= \boxed{\frac{-7x - 10}{3x + 2}}$$

c) Find $f(g(2))$

$$g(2) = \frac{4(2)}{3(2) + 2} = \frac{8}{6 + 2} = \frac{8}{8} = 1$$

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

$$= 2(1) - 5 = 2 - 5$$

$$= \boxed{-3}$$

3. Rationalize each denominator. Simplify answer if possible.

a) $\frac{36ab^2}{\sqrt[3]{36a^7b^{14}}} \cdot \frac{\sqrt[3]{6a^2b}}{\sqrt[3]{6a^2b}}$

$$= \frac{36ab^2 \sqrt[3]{6a^2b}}{\sqrt[3]{216a^9b^{15}}}$$

$$= \frac{36ab^2 \sqrt[3]{6a^2b}}{6a^3b^5}$$

$$= \boxed{\frac{6\sqrt[3]{6a^2b}}{a^2b^3}}$$

b) $\frac{21}{9 - \sqrt{6}} \cdot \frac{9 + \sqrt{6}}{9 + \sqrt{6}}$

$$= \frac{21(9 + \sqrt{6})}{75}$$

$$= \frac{7(9 + \sqrt{6})}{25}$$

$$\text{or } \frac{63 + 7\sqrt{6}}{25}$$

$$\begin{array}{r} 9 - \sqrt{6} \\ 9 \quad \begin{array}{|c|c|} \hline 81 & -9\sqrt{6} \\ \hline \end{array} \\ + \sqrt{6} \quad \begin{array}{|c|c|} \hline +9\sqrt{6} & -6 \\ \hline \end{array} \\ \hline = 75 \end{array}$$

4. Simplify. Rationalize denominator as needed.

$$\frac{\sqrt{21d^5e^{16}}}{\sqrt{48d^{19}e^3}} = \frac{\sqrt{7e^3}}{\sqrt{16d^{14}}}$$

Reduce fraction first

$$= \boxed{\frac{e^6 \sqrt{7e}}{4d^7}}$$

Simplify sq. roots second