Key

Chapter 7 Review

Section 7.1

1) **For $f(x) = x^2 - 2x + 5$ and $g(x) = 2x + 3$**

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

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

$\boxed{x^2 + 8}$

b) Find $(f - g)(x)$

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

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

$\boxed{x^2 - 4x + 2}$

c) Find $(f \bullet g)(x)$

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

$2x^3 + 3x^2 - 4x^2 - 6x + 10x + 15$

$\boxed{2x^3 - x^2 + 4x + 15}$

d) Find $\left(\frac{f}{g}\right)(x)$

$\boxed{\frac{x^2 - 2x + 5}{2x + 3},\ x \neq \frac{-3}{2}}$

2) **For $f = \{(1, 2), (5, 3), (3, 1), (2, 5)\}$ and $g = \{(5, 2), (3, 8), (1, 3), (2, 1)\}$**

a) Find $f \circ g$

$g(x)$	$f(x)$
$g(5) = 2$	$f(2) = 5$
$g(3) = 8$	$f(8) = \varnothing$
$g(1) = 3$	$f(3) = 1$
$g(2) = 1$	$f(1) = 2$

$\boxed{(5,5)(1,1)(2,2)}$

b) Find $g \circ f$

$f(x)$	$g(x)$
$f(1) = 2$	$g(2) = 1$
$f(5) = 3$	$g(3) = 8$
$f(3) = 1$	$g(1) = 3$
$f(2) = 5$	$g(5) = 2$

$\boxed{(1,1)(5,8)(3,3)(2,2)}$

3) **For $g(x) = 5x - 4$ and $f(x) = x^2 + 3x - 2$**

a) Find $[g \circ f](x)$

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

$= 5x^2 + 15x - 10 - 4$

$= \boxed{5x^2 + 15x - 14}$

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

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

$= 25x^2 - 40x + 16 + 15x - 12 - 2$

$= \boxed{25x^2 - 25x + 2}$

4) **If $f(x) = 5x$, $g(x) = 3x - 4$ and $h(x) = x^2 + 7$, find the value of each.**

a) $f[g(5)]$

$g(5) = 3(5) - 4$

$= 11$

$f(11) = 5(11)$

$= \boxed{55}$

b) $g[h(-3)]$

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

$= 16$

$g(16) = 3(16) - 4$

$= \boxed{44}$

c) $[f \circ (g \circ h)](-3)$

$h(-3) = 16$

$g(16) = 44$

$f(44) = 5(44)$

$= \boxed{220}$

Section 7.2

5) **Find the inverse of each function. Then graph the function and its inverse.**

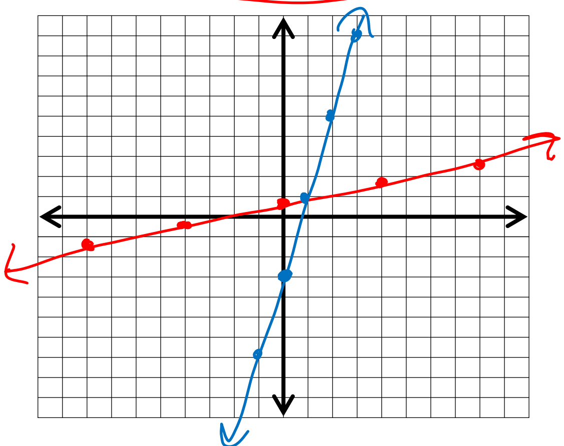
a) $f(x) = 4x - 3$

$x = 4y - 3$

$x + 3 = 4y$

$\frac{1}{4}x + \frac{3}{4} = y$

inverse $\frac{1}{4}x + \frac{3}{4} = f^{-1}(x)$

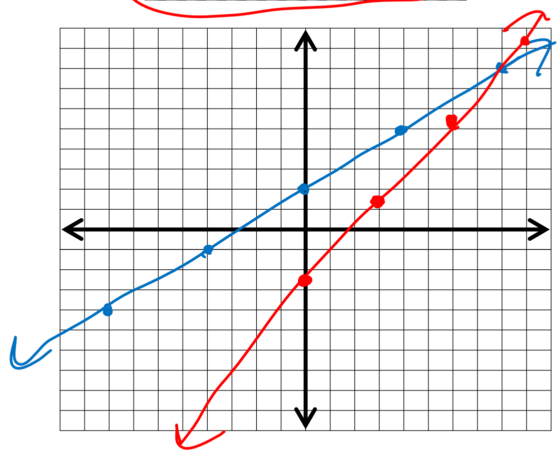


b) $f(x) = \frac{3}{4}x + 2$

$x = \frac{3}{4}y + 2$

$x - 2 = \frac{3}{4}y$

inverse $\frac{4}{3}x - \frac{8}{3} = f^{-1}(x)$



6) **Using the composition of functions method, determine whether each pair of functions are inverses of each other.**

a) $f(x) = 3x + 12$

$g(x) = \frac{1}{3}x - 5$

$f(g(x)) = 3(\frac{1}{3}x - 5) + 12$

$= x - 15 + 12$

$= x - 3$

no

b) $f(x) = \frac{2}{3}x - 6$

$g(x) = \frac{3}{2}x + 9$

$f(g(x)) = \frac{2}{3}(\frac{3}{2}x + 9) - 6$

$= x + 6 - 6$

$= \boxed{x}$

$g(f(x)) = \frac{3}{2}(\frac{2}{3}x - 6) + 9$

$= x - 9 + 9$

$= \boxed{x}$

yes!

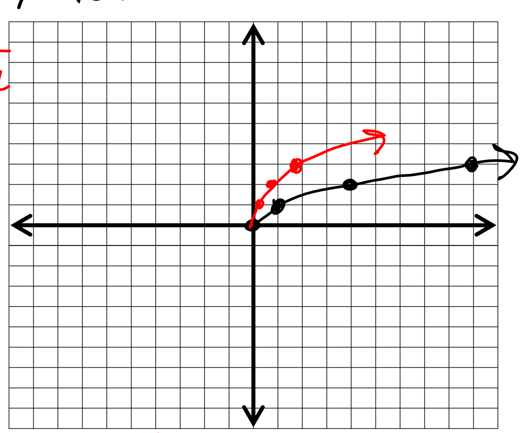
Section 7.3

7) **Graph each function. State the domain and range if the function.**

a) $y = \sqrt{5x}$

H

① Shrink by $\frac{1}{5}$



Domain $x \geq 0$

Range $y \geq 0$

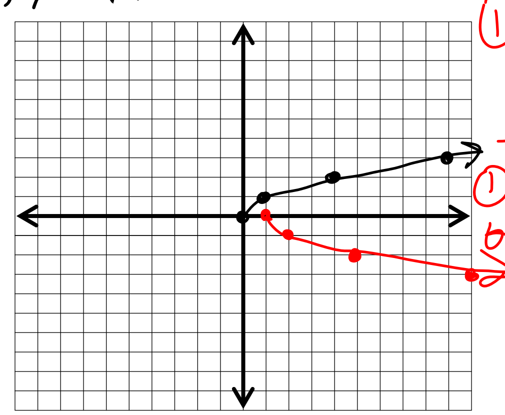
b) $y = -\sqrt{x - 1}$

H

① Right 1

V

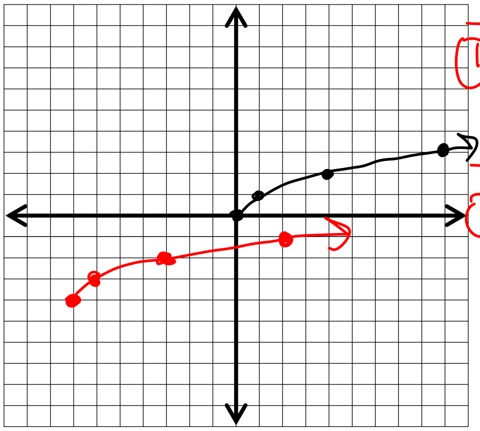
① Reflect over x



Domain $x \geq 1$

Range $y \leq 0$

c) $y = \sqrt{x+7} - 4$



H

① Left 7

V

① Down 4

Domain $x \geq -7$

Range $y \geq -4$

Section 7.4/7.5

8) **Simplify.**

a) $\pm\sqrt[4]{81}$

$\pm\sqrt[4]{3^4}$

$\boxed{\pm 3}$

b) $-\sqrt[3]{27x^6y^8}$

$-\sqrt[3]{3^3 (x^2)^3 (y^2)^3 \cdot y^2}$

$\boxed{-3x^2y^2\sqrt[3]{y^2}}$

c) $\sqrt[5]{-32x^6y^{10}}$

$\sqrt[5]{(-2)^5 \cdot x^5 \cdot x \cdot (y^2)^5}$

$\boxed{-2xy^2\sqrt[5]{x}}$

d) $\sqrt[2]{(x+4)^2}$

$\boxed{x+4}$

e) $5\sqrt{12} + 2\sqrt{75} - \sqrt{27}$

$2\sqrt{3} \quad 5\sqrt{3} \quad 3\sqrt{3}$

$10\sqrt{3} + 10\sqrt{3} - 3\sqrt{3}$

$\boxed{17\sqrt{3}}$

f) $6\sqrt{15} \bullet 5\sqrt{20}$

$30\sqrt{300}$

$30 \cdot 10\sqrt{3}$

$\boxed{300\sqrt{3}}$

g) $(\sqrt{5} - \sqrt{2})(\sqrt{5} + \sqrt{6})$

$5 + \sqrt{30} - \sqrt{10} - \sqrt{12}$

$\boxed{5 + \sqrt{30} - \sqrt{10} - 2\sqrt{3}}$

h) $(2\sqrt{7} - \sqrt{3})^2$

$(2\sqrt{7} - \sqrt{3})(2\sqrt{7} - \sqrt{3})$

$28 - 2\sqrt{21} - 2\sqrt{21} + 3$

$\boxed{31 - 4\sqrt{21}}$

i) $\sqrt[3]{\frac{3a^4}{24}} = \sqrt[3]{\frac{a^4}{8}} = \frac{\sqrt[3]{a^4}}{\sqrt[3]{8}}$

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

j) $\dfrac{2+\sqrt{5}}{4-\sqrt{3}} \dfrac{(4+\sqrt{3})}{(4+\sqrt{3})}$

$\dfrac{8+2\sqrt{3}+4\sqrt{5}+\sqrt{15}}{16-3} = \boxed{\dfrac{8+2\sqrt{3}+4\sqrt{5}+\sqrt{15}}{13}}$

k) $\sqrt[3]{128a^4b^8} = \sqrt[3]{4^3 \cdot 2 \cdot a^3 \cdot a \cdot (b^2)^3 \cdot b^2}$ (64, 2)

$= \boxed{4ab^2 \sqrt[3]{2ab^2}}$

l) $\sqrt{\dfrac{8}{9a}} = \dfrac{\sqrt{2^2 \cdot 2}}{\sqrt{3^2 \cdot a}} = \dfrac{2\sqrt{2}}{3\sqrt{a}} \cdot \dfrac{\sqrt{a}}{\sqrt{a}}$

$= \boxed{\dfrac{2\sqrt{2a}}{3a}}$

Section 7.6

9) **Write each expression in radical form. Simplify, if possible.**

a) $12^{\frac{1}{6}} = \boxed{\sqrt[6]{12}}$

b) $5^{\frac{3}{2}} = \sqrt[2]{5^3} = \sqrt[2]{5^2 \cdot 5}$

$= \boxed{5\sqrt{5}}$

c) $2^{\frac{8}{5}} = \sqrt[5]{2^8} = \sqrt[5]{2^5 \cdot 2^3}$

$= \boxed{2\sqrt[5]{8}}$

10) **Write each radical using rational exponents. Simplify, if possible.**

a) $\sqrt{21} = \boxed{21^{1/2}}$

b) $\sqrt[3]{27a^6} = (27)^{1/3}(a^6)^{1/3}$

$= (3^3)^{1/3} \cdot a^2$

$= \boxed{3a^2}$

11) **Evaluate each expression.**

a) $8^{\frac{2}{3}} = (2^3)^{\frac{2}{3}}$

$= 2^2$

$= \boxed{4}$

b) $-16^{\frac{3}{4}} = -(2^4)^{\frac{3}{4}}$

$= -(2^3)$

$= \boxed{-8}$

c) $\dfrac{144^{-\frac{1}{2}}}{125^{-\frac{1}{3}}} = \dfrac{((12^2)^{\frac{1}{2}})^{-1}}{((5^3)^{\frac{1}{3}})^{-1}} = \dfrac{12^{-1}}{5^{-1}}$

$= \boxed{\dfrac{5}{12}}$

d) $121^{-\frac{1}{2}} = ((11^2)^{\frac{1}{2}})^{-1}$

$= (11)^{-1}$

$= \boxed{\dfrac{1}{11}}$

e) $\left(\dfrac{9}{49}\right)^{-\frac{3}{2}} = \left(\dfrac{(3^2)^{3/2}}{(7^2)^{3/2}}\right)^{-1}$

$= \left(\dfrac{3^3}{7^3}\right)^{-1} = \left(\dfrac{27}{343}\right)^{-1}$

$= \boxed{\dfrac{343}{27}}$

f) $\dfrac{32}{8^{\frac{4}{3}}} = \dfrac{32}{(2^3)^{\frac{4}{3}}} = \dfrac{32}{2^4} = \dfrac{32}{16}$

$= \boxed{2}$

12) **Simplify each expression.**

a) $x^{\frac{3}{5}} \cdot x^{\frac{7}{5}} = x^{\frac{10}{5}} = \boxed{x^2}$

b) $y^{\frac{3}{2}} \bullet y^{\frac{3}{2}} = y^{\frac{6}{2}} = \boxed{y^3}$

c) $\left(x^{\frac{4}{3}}\right)^{\frac{9}{2}} = x^{\frac{36}{6}} = \boxed{x^6}$

d) $\sqrt[4]{32} = \sqrt[4]{2^4 \cdot 2}$
$= \boxed{2\sqrt[2]{2}}$

e) $\overset{4\sqrt{2}}{\sqrt{32}} \bullet 3\sqrt{16}$
$12\sqrt{32}$
$12 \cdot 4\sqrt{2}$
$\boxed{48\sqrt{2}}$

f) $\sqrt[2]{\sqrt[3]{64}} = \left(\left(64^{\frac{1}{3}}\right)\right)^{\frac{1}{2}}$
$= 64^{\frac{1}{6}} = \left(2^6\right)^{\frac{1}{6}} = \boxed{2}$

g) $\dfrac{x^{-\frac{1}{3}}}{x^{-\frac{1}{2}}}$ } subtract $= \boxed{x^{\frac{1}{6}}}$

h) $9^{\frac{1}{3}} \bullet 9^{\frac{5}{3}} = \left(3^2\right)^2 = \boxed{81}$

$-\frac{2}{6} + {}^{+}\frac{3}{6} = \frac{1}{6}$