

1) (2 points) Section 6.1 Simplify the radical expression given below.

$$\sqrt{27x^4y^8z^9}$$

$$\sqrt{9x^4y^8z^8} \sqrt{3z}$$

PERFECT
SQUARES

$$3x^2y^4z^4\sqrt{3z}$$

2) (4 points) **Section 6.2** Simplify the radical expressions given below.

a) $-2\sqrt[3]{2x^2y^2} \cdot 2\sqrt[3]{15x^5y}$

b) $\frac{\sqrt{3xy^2}}{\sqrt{5x^2y^3}}$

a)
$$-4\sqrt[3]{30x^7y^3} = -4\sqrt[3]{x^6y^3}\sqrt[3]{30x}$$

$$= -4(x^2y)\sqrt[3]{30x} = -4x^2y\sqrt[3]{30x}$$

b)
$$\sqrt{\frac{3xy^2}{5x^2y^3}} = \sqrt{\frac{3}{5xy}} = \frac{\sqrt{3}}{\sqrt{5xy}} \cdot \frac{\sqrt{5xy}}{\sqrt{5xy}}$$

$$= \frac{\sqrt{15xy}}{5xy}$$

3) (5 points) **Section 6.3** Simplify the radical expressions given below.

a) $(2\sqrt{5} + 3\sqrt{2})(5\sqrt{5} + 7\sqrt{2})$

b) $\frac{4+\sqrt{6}}{\sqrt{2}+\sqrt{3}}$

$$\begin{aligned} a) \quad & 10\sqrt{25} + 14\sqrt{10} + 15\sqrt{10} + 21\sqrt{4} \\ & 50 + 29\sqrt{10} + 42 \end{aligned}$$

$$= 92 + 29\sqrt{10}$$

$$b) \quad \frac{4+\sqrt{6}}{\sqrt{2}+\sqrt{3}} \cdot \frac{\sqrt{2}-\sqrt{3}}{\sqrt{2}-\sqrt{3}} = \frac{4\sqrt{2}-4\sqrt{3}+\sqrt{2}-\sqrt{18}}{2-\sqrt{6}+\sqrt{6}-3}$$

$$= \frac{4\sqrt{2} - 4\sqrt{3} + 2\sqrt{2} - 3\sqrt{2}}{-1}$$

$$= \frac{\sqrt{2} - 2\sqrt{3}}{-1} = 2\sqrt{3} - \sqrt{2}$$

4) (5 points) **Section 6.4** Simplify each of the expressions given below.

a) $27^{-\frac{2}{3}}$

$$a) \frac{1}{27^{\frac{2}{3}}} = \frac{1}{(\sqrt[3]{27})^2}$$

b) $(x^{\frac{1}{2}}y^{-\frac{2}{3}})^{-6}$

c) $\frac{64^{\frac{1}{3}}x^{\frac{2}{3}}y^{-\frac{1}{4}}}{x^{\frac{1}{2}}y^{-\frac{1}{2}}}$

$$= \frac{1}{3^2} = \frac{1}{9}$$

$$b) x^{-3}y^4 = \frac{y^4}{x^3}$$

$$c) 4x^{\frac{2}{3} - \frac{1}{2}}y^{-\frac{1}{4} - (-\frac{1}{2})}$$

$$= 4x^{\frac{1}{6}}y^{\frac{1}{4}}$$

5) (8 points) **Section 6.5** Solve the equation given below.

$$\sqrt{3x+7} + 1 = x$$

$$\sqrt{3x+7} = x-1$$

$$(\sqrt{3x+7})^2 = (x-1)^2$$

$$3x+7 = x^2 - 2x + 1$$

$$x^2 - 5x - 6 = 0$$

$$(x-6)(x+1) = 0$$

$$x = 6, -1$$

$x = -1$ is **EXTRANEOUS**
(DOESN'T CHECK)

$$x = 6$$

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- 6) (8 points) Section 6.6 Let $f(x) = 2x^2 - 3x + 1$ and $g(x) = x - 4$. Find the following
- $f(g(-3))$
 - $(f \circ g)(x)$
 - $g(f(-1))$
 - $f(x) \cdot g(x)$
 - $\frac{g(x)}{f(x)}$ and list the domain of the result.

a) SINCE $g(-3) = -3 - 4 = -7$, THEN

$$f(g(-3)) = f(-7) = 2(-7)^2 - 3(-7) + 1$$

$$= 98 + 21 + 1 = 120$$

b) $(f \circ g)(x) = f(g(x)) = f(x-4)$

$$= 2(x-4)^2 - 3(x-4) + 1$$

$$= 2(x^2 - 8x + 16) - 3x + 12 + 1$$

$$= 2x^2 - 16x + 32 - 3x + 13$$

$$= 2x^2 - 19x + 45$$

c) $g(f(-1))$ $f(-1) = 2(-1)^2 - 3(-1) + 1$

$$= 2 + 3 + 1 = 6$$

$$g(f(-1)) = g(6) = 6 - 4 = 2$$

d) $f(x) \cdot g(x) = \underbrace{(2x^2 - 3x + 1)}_{f(x)} \underbrace{(x - 4)}_{g(x)}$

$$= 2x^3 - 8x^2 - 3x^2 + 12x + x - 4$$

$$= 2x^3 - 11x^2 + 13x - 4$$

e) $\frac{g(x)}{f(x)} = \frac{x-4}{2x^2-3x+1}$

TO FIND DOMAIN, DENOMINATOR CANNOT BE 0.

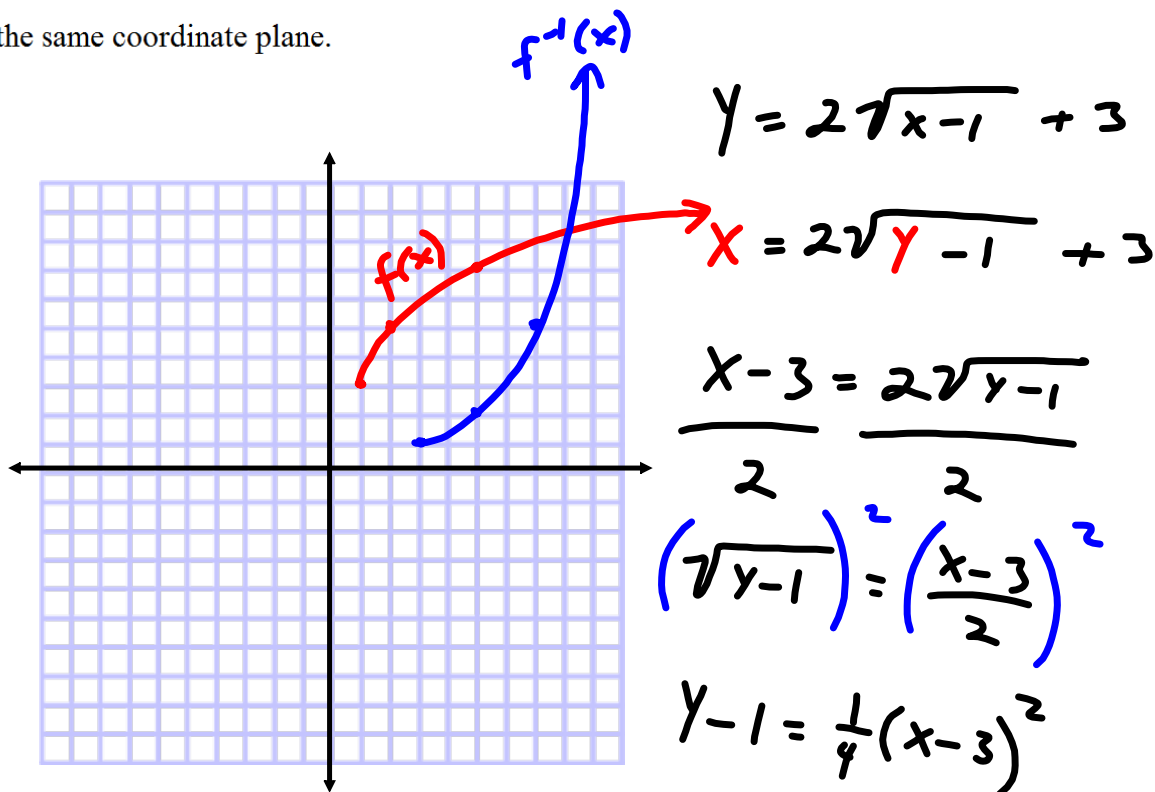
$$2x^2 - 3x + 1 = 0$$

$$(2x - 1)(x - 1)$$

$$x = \frac{1}{2}, 1$$

So, DOMAIN:
 $x \neq \frac{1}{2}, 1$

7) (10 points) Section 6.7 Let $f(x) = 2\sqrt{x-1} + 3$. Find $f^{-1}(x)$ and graph both $f(x)$ and $f^{-1}(x)$ on the same coordinate plane.

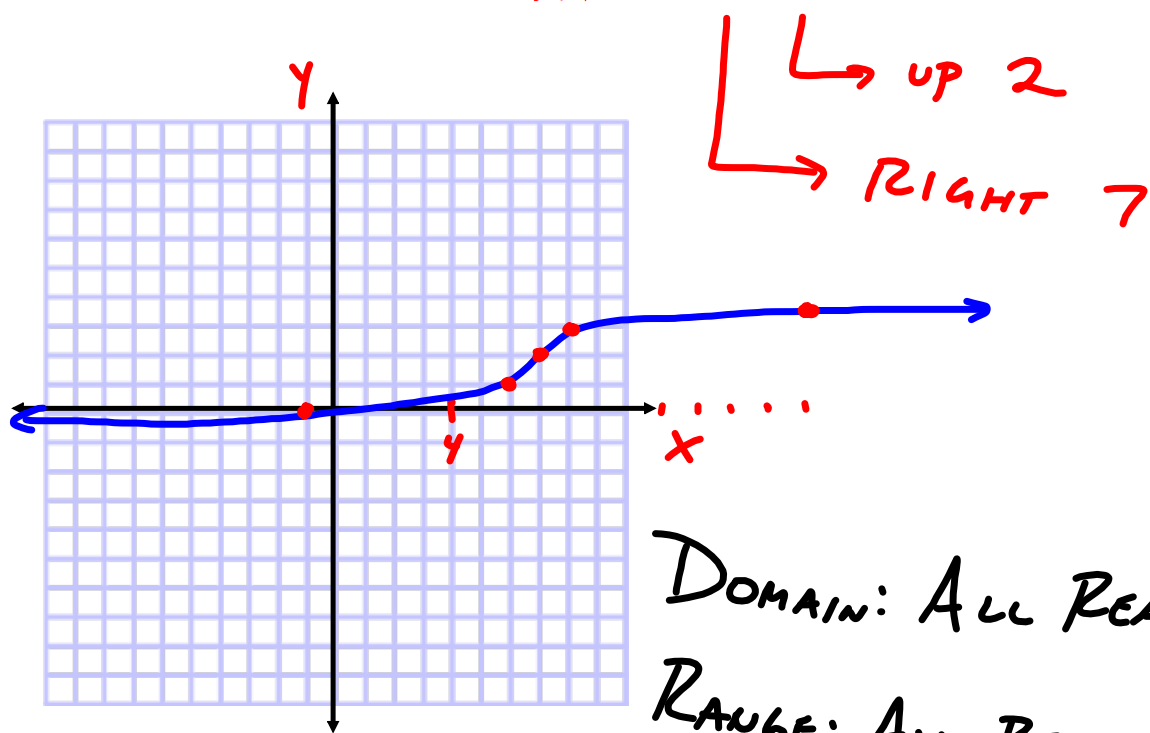


$$f^{-1}(x) = \frac{1}{4}(x-3)^2 + 1$$

DOMAIN $f(x)$: $x \geq 1$ DOMAIN $f^{-1}(x)$: $x \geq 3$
 RANGE OF $f(x)$: $y \geq 3$ RANGE $f^{-1}(x)$: $y \geq 1$

8) (8 points) **Section 6.8** Graph the function given below. List the domain and the range.

$$f(x) = \sqrt[3]{x-7} + 2$$



DOMAIN: ALL REALS

RANGE: ALL REALS