Homework #3-4
Simplifying Radicals

1.) Simplify each of the following square roots.

(a) $\sqrt{18x^4}$

$\sqrt{\underline{\underline{9}} \cdot 2 \cdot \underline{\underline{x^4}}}$

$\boxed{3x^2\sqrt{2}}$

(b) $\sqrt{200x^5y^3}$

$\sqrt{\underline{\underline{100}} \cdot 2 \cdot \underline{\underline{x^4}} \cdot x \cdot \underline{\underline{y^2}} \cdot y}$

$\boxed{10x^2y\sqrt{2xy}}$

(c) $\sqrt{147x^9y^4}$

$\sqrt{\underline{\underline{49}} \cdot 3 \cdot \underline{\underline{x^8}} \cdot x \cdot \underline{\underline{y^4}}}$

$\boxed{7x^4y^2\sqrt{3x}}$

(d) $\sqrt{75x^{16}y^{11}}$

$\sqrt{\underline{\underline{25}} \cdot 3 \cdot \underline{\underline{x^{16}}} \cdot \underline{\underline{y^{10}}} \cdot y}$

$\boxed{5x^8y^{10}\sqrt{3y}}$

(e) $3x^2y\sqrt{98x^5y^8}$

$3x^2y\sqrt{\underline{\underline{49}} \cdot 2 \cdot \underline{\underline{x^4}} \cdot x \cdot \underline{\underline{y^8}}}$

$3x^2y\, 7x^2y^4\sqrt{2x}$

$\boxed{21x^4y^5\sqrt{2x}}$

2.) Simplify each of the following higher order roots.

(a) $\sqrt[3]{16}$

$\sqrt[3]{\underline{\underline{8}} \cdot 2}$

$\boxed{2\sqrt[3]{2}}$

(b) $\sqrt[3]{108}$

$\sqrt[3]{\underline{\underline{27}} \cdot 4}$

$\boxed{3\sqrt[3]{4}}$

(c) $\sqrt[4]{48x^{10}y^5}$

$\sqrt[4]{\underline{\underline{16}} \cdot 3 \cdot \underline{\underline{x^8}} \cdot x^2 \cdot \underline{\underline{y^4}} \cdot y}$

$\boxed{2x^2y\sqrt[4]{3x^2y}}$

(d) $\sqrt[5]{64x^{12}y^{15}}$

$\sqrt[5]{\underline{\underline{32}} \cdot 2 \cdot \underline{\underline{x^{10}}} \cdot x^2 \cdot \underline{\underline{y^{15}}}}$

$\boxed{2x^5y^3\sqrt[5]{2x^2}}$

3.) The radical expression $\sqrt{50x^5y^3}$ can be rewritten equivalently as

(1) $25xy\sqrt{2xy}$

(2) $5xy\sqrt{xy}$

(3) $5x^2y\sqrt{2xy}$ ⟵ circled

(4) $10x^2y\sqrt{5xy}$

$\sqrt{\underline{\underline{25}} \cdot 2 \cdot \underline{\underline{x^4}} \cdot x \cdot \underline{\underline{y^2}} \cdot y}$

$5x^2y\sqrt{2xy}$

4.) What is the domain of the function $f(x) = \sqrt{x-9}$?

$$X - 9 \geq 0$$
$$X \geq 9$$

5.) Which of the following tables illustrates a relationship in which y is a one-to-one function of x?

→ Neither x nor y values can repeat!

(1)

x	y
-2	-1
0	-3
2	-1
4	1
6	3

(2)

x	y
-2	-8
-1	-1
0	0
1	1
2	8

(3)

x	y
-2	-5
-1	-4
0	-1
-1	7
-2	5

(4)

x	y
-2	11
-1	-4
0	-5
1	-4
2	11

6.) Given the two functions, $f(x) = 2x - 4$ and $g(x) = x^2 + 7$.
Calculate the average rate of change for both functions over the following intervals.

(a) $0 \leq x \leq 4$

$f(x)$
$(0, -4)$ $\quad \dfrac{4-(-4)}{4-0} = 2$
$(4, 4)$

$g(x)$
$(0, 7)$ $\quad \dfrac{23-7}{4-0} = 4$
$(4, 23)$

(b) $6 \leq x \leq 9$

$f(x)$
$(6, 8)$ $\quad \dfrac{14-8}{9-6} = 2$
$(9, 14)$

$g(x)$
$(6, 43)$ $\quad \dfrac{88-43}{9-6} = 15$
$(9, 88)$

Which function has the same average rate of change for both intervals? Explain why this is.

$f(x)$ because it is a linear function, which has a constant rate of change!

7.) Given the function $f(x) = \sqrt{2x - 4}$:
a) Graph $f(x)$ on the axes.
b) Find the inverse of $f(x)$.

$$(x)^2 = (\sqrt{2y - 4})^2$$
$$x^2 = 2y - 4$$
$$\frac{x^2}{2} - \frac{4}{2} = \frac{2y}{2}$$
$$\frac{1}{2}x^2 - 2 = y$$

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