1.1 Simplify expressions

$(-x^4y^2)^2 = -x^4y^2(-x)^4y^6 = x^8y^4$

$9(3^0) = 9 \cdot 1 = 9$

$(2a^2)(4a^4) = 8a^{2+4} = 8a^6$

$\frac{x^4}{x^3} = x^{4-3} = x$

$(-2)^{7-4} = (-2)^3 = -8$

$\left(\frac{1}{27b^3}\right)^{1/3} = \sqrt[3]{\frac{1}{27b^3}} = \frac{\sqrt[3]{1}}{\sqrt[3]{27b^3}} = \frac{1}{3b}$

$y^7y^6y^5y^4 = y^{22}$

$\frac{2a/7b}{11b/5a} = \frac{2a}{7b} \cdot \frac{5a}{11b} = \frac{10a^2}{77b^2}$

$(z^2)^4 = z^{2 \cdot 4} = z^8$

1.2

$$a^2 + b^2 + 2ab + a^2 + b^2 - 2ab + 2a^2 - 2b^2 - 3a^2$$
$$= 4a^2 + 3a^2 = a^2$$

1.3

$$\sqrt[3]{2^3} = 2 \qquad \sqrt[3]{27} = 3 \qquad \sqrt[4]{625} = 5$$

1.4 Relationship between Fahrenheit and Centigrade as a linear function

$$5f - 9y = 160 \Leftrightarrow -9y = 160 - 5f \Leftrightarrow y = \frac{160 - 5f}{-9}$$
$$y = -\frac{160}{9} + \frac{5}{9}f \quad \text{graph using R}$$

1.6

$$x - 3 < 2x + 15 \Leftrightarrow x < 2x + 18 \Leftrightarrow x - 2x < 18$$
$$\Leftrightarrow -x < 18 \Leftrightarrow x > -18$$

flipping the sign when multiplying by a negative number.

$$11 - \frac{4}{3}t > 3 \Leftrightarrow -\frac{4}{3}t > -8 \Leftrightarrow 4t < 24$$
$$\Leftrightarrow t < \frac{24}{4} \Leftrightarrow t < 6$$

$$\frac{5}{6}y + 3(y-1) \leq \frac{11}{6}(1-y) + 2y$$

$$\frac{5}{6}y + 3y - 3 \leq \frac{11}{6} - \frac{11}{6}y + 2y$$

$$3y - 3 \leq \frac{11}{6} - \frac{16}{6}y + 2y$$

$$18y - 18 \leq 11 - 16y + 12y$$
$$-18 - 11 \leq -16y + 12y - 18y$$
$$-29 \leq -22y$$
$$\frac{29}{22} \geq y$$

1.15 Changing logarithmic base

$$\log_a(x) = \frac{\log_b(x)}{\log_b(a)}$$

$$\log_3(36) = \frac{\log_6(36)}{\log_3(3)}$$

1.21 5 unit positive change in state-level unemployment

$$\delta Y = m(\delta X) + b$$

$$= 2.41(5) + 27$$

$$= 39.05$$

↳ the expected change in homicides per 100.00