Section 6.1

#21. \( \frac{1}{2} x^2 - 5x + 2 \quad x = \frac{2}{3} \)

\[
\frac{1}{4} \left( \frac{2}{3} \right)^2 - 5 \left( \frac{2}{3} \right) + 2
\]

\[
= \frac{1}{4} \left( \frac{4}{9} \right) - \frac{10}{3} + 2
\]

\[
= \frac{2}{9} - \frac{10}{3} \cdot \frac{3}{3} + 2 \cdot \frac{9}{9}
\]

\[
= \frac{2 - 30 + 18}{9} = \frac{-10}{9}
\]
\[ \frac{1}{2}(\frac{2}{3})^2 - 5\left(\frac{2}{3}\right) + 2 = -1.111111111 \text{ Frac} = \frac{-10}{9} \]
#23. $8x^3 - 4x^2 + 7 \quad x = \frac{1}{2}$

$8 \left( \frac{1}{2} \right)^3 - 4 \left( \frac{1}{2} \right)^2 + 7$

$= 8 \left( \frac{1}{8} \right) - 4 \left( \frac{1}{4} \right) + 7$

$= 1 - 1 + 7 = 7$
Section 6.2

#43. \( \frac{3}{X} = \frac{7}{8} \)  \quad \text{LCD} = 8X

\[ 8X \left( \frac{\frac{3}{X}}{X} \right) = 8X \left( \frac{7}{8} \right) \]

\[ 24 = 7X \]

\[ \frac{24}{7} = \frac{7X}{X} \]

\[ x = \frac{24}{7} \]

OR \[ \frac{3}{X} = \frac{7}{8} \]

\[ 3(8) = x(7) \]

\[ 24 = 7x \quad \text{etc.} \]
\[
\frac{3}{24\div7} = 0.875
\]
Ans\*Frac
\[
7/8
\]
Formulas

A formula is an equation that usually has a real-life application. (contains more than one variable.)

A formula (or equation) or a group of equations may represent a mathematical model for a real situation.
Some formulas may contain Greek letters:

\[ N (\mu) \]
\[ \sigma (\sigma) \]
\[ \delta (\delta) \]
\[ \varepsilon (\varepsilon) \]
\[ \pi (\pi) \]
\[ \theta (\theta) \]
\[ \lambda (\lambda) \]

ex. \[ z = \frac{X - \mu}{\sigma / \sqrt{n}} \]

"z-score"
Exponential equations

exponential growth (variable is the exponent)

$2^x$, $3^x$, ...

ex. continuously compounded interest

$P = P_0 e^{kt}$

$e \approx 2.718$

$P_0, k$ constants

$P$, $t$ variables

$P_0$ "$P_{\text{sub 0}}$" or "$P_{\text{naught}}$" (value of when $t = 0$)
If we write $x_1, x_2, x_3, \ldots$, these are called subscripted variables.

\[ x_1 = \text{temperature on Jan. 1} \]
\[ x_2 = \text{temperature on Jan. 2} \]
\[ \text{etc.} \]
Ex. (from pp. 279-80) Use the formula to find the value of the indicated variable for the values given:

#10. \( F = ma \); find \( m \) when \( F = 40 \) and \( a = 5 \)

\[
40 = m(5) \quad \frac{40}{5} = \frac{8m}{8} \quad 8 = m
\]
#14. \[ z = \frac{x - \mu}{\sigma}; \text{find } z \text{ when } x = 100, \]
\[ \mu = 110, \sigma = 5 \]
\[ z = \frac{100 - 110}{5} = -\frac{10}{5} = -2 \]

#16. \[ S = B + \frac{1}{2} Ps; \text{find } P \text{ when } \]
\[ S = 10, S = 300, B = 100 \]
\[ (S \text{ and } s \text{ are different variables}) \]
\[ \frac{200}{5} = \frac{5P}{5} \]
\[ 40 = P \]
Solve for y:

#40. \( 4x - 3y = 21 \)

\[
\begin{align*}
-4x & \quad -4x \\
\hline
-3y & = -4x + 21 \\
\hline
\end{align*}
\]

\[
\begin{align*}
-3y & = -4x + 21 \\
\hline
\frac{-3y}{-3} & = \frac{-4x}{-3} + \frac{21}{-3} \\
\hline
y & = \frac{4}{3}x - 7 \\
\hline
\end{align*}
\]

#44. \( 3x + 4y = 0 \)

\[
\begin{align*}
-3x & \quad -3x \\
\hline
4y & = -3x \\
\hline
\frac{4y}{4} & = \frac{-3x}{4} \\
\hline
y & = -\frac{3}{4}x \\
\hline
\end{align*}
\]
Find \( P \) when \( P_0 = 20 \) and \( t = 5800 \)
if \( P = P_0 \cdot 2^{-\frac{t}{5000}} \)

\[
P = 20 \cdot 2^{-\frac{5800}{5000}}
\]
$20 \times 2^{(-500/5600)} = 18.79976054$
Applications of Linear Equations in One Variable:

(see p.281 examples)

ex. (from pp. 284-85) Write the phrase as a mathematical expression or write an equation and solve:

#4. 3 times x increased by 7

\[
3x + 7
\]

3 times the quantity x increased by 7
#24. A number divided by 3 is 4 less than the number.

\[
\frac{x}{3} = x - 4 \quad \text{(mult. by 3)}
\]

\[
3 \left( \frac{x}{3} \right) = 3x - 3(4)
\]

\[
x = 3x - 12
\]

\[
-3x - 3x
\]

\[
-2x = -12
\]

\[
x = 6
\]

Check:

\[
\frac{6}{3} = 6 - 4
\]

\[
\frac{x}{2} = \frac{6}{2} = 3
\]
#8. 2 times m increased by 9
\[2m + 9\]

#12. 15 decreased by \(t\), divided by 4
\[\frac{15 - t}{4}\]

#20. Four times a number decreased by 10 is 42. Solve.
\[4x - 10 = 42\]
\[4x = 52\]
\[x = 13\]
#28. Set up an equation and solve.
Miguel purchases 2 new pairs of pants at the Gap for $60. If one pair was $10 more than the other, how much was the more expensive pair?

Let \( x \) = cost of the more expensive pair

\[ x - 10 = \text{cost of the less expensive pair} \]

\[ x + (x-10) = 60 \]

\[ 2x - 10 = 60 \]

\[ \frac{2x}{2} = \frac{60 + 10}{2} \]

\[ x = 35 \]