4.1 Forms of Lines and Intersection

*Reviewing Format of Linear Equations

*Building Linear Equations

*Reading on Equations as Models

*Intersecting Equations Reminder

*Assignment Time - keep all problems in one packet

### 4.1 Equations of Lines - Format

**Slope-Intercept Form**

\[ y = mx + b \]

- useful when you are given the equation and you are trying to graph it
- \( m \) is the slope and \( b \) is the y-intercept

**Point-Slope Form**

\[ y - y_1 = m(x - x_1) \]

\[ y = m(x - x_1) + y_1 \]

- useful when you know the slope and a point, want to build the equation
- \( m \) is the slope and \((x_1, y_1)\) is the point given

**General Form**

\[ Ax + By + C = 0 \]

- seldom useful, but equations are often stated in this form
- \( A, B, \) and \( C \) are all integers, \( A \) and \( B \) are not both zero
Example #1
Find all three forms of the equation that has a slope of 5 and passes through the point (8, -3)

\[
\begin{align*}
\text{Slope - intercept:} & & \text{Point - slope:} & & \text{General Form:} \\
y &= mx + b & y &= m(x - x_1) + y_1 & y &= 5x - 43 \\
y &= 5x + b & y &= 5(x - x_1) + y_1 & -y - 43 = 0 \\
-3 &= 5(x_1) + b & y &= 5(x - 8) - 3 & \quad 0 = 5x - y - 43 \\
-3 &= 40 + b & y &= 5(x - 8) - 3 & 5x - y - 43 = 0 \\
-43 &= b & y &= 5(x - 8) - 3 \\
& & y &= 5x - 43
\end{align*}
\]
3.2 Intersecting Curves

Intersection
- where two graphs meet, and have common points
- the intersection "points" are x and y-values that satisfy both equations

Possible Intersections (lines and circles)
Horizontal and Vertical Line (1)

\[(a, b)\]
\[y = b\]
\[\chi = \alpha\]

Line and Circle (1)

Line and Circle (2)

\[(a, ?)\]
\[\chi = \alpha\]

Assignment (Due "Wednesday 9/26")

1) Read Sections 4.1 - 4.4 to work with modeling 4.9 for parallel and perpendicular lines

2) Chapter 4 Problems Packet
   a) 4.1

   b) 4.2 / 4.4 / 4.5 / 4.9

   - packet should be nice neat collection of complete and well organized work. If you want to "scratch" them out first, that is probably a good idea!