Math 16A

Pre-Calculus Review

**Absolute Value**

**Defn:** The absolute value of a real # \( z \) is

\[
|z| = \begin{cases} 
  z & \text{if } z \geq 0 \\
  -z & \text{if } z < 0
\end{cases}
\]

**Rule:** \( \sqrt{z^2} = |z| \)

**Lines**

**Defn:** The slope of the line passing through points \( (x_1, y_1) \) & \( (x_2, y_2) \) is

\[
m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x} = \text{"rise" \over \"run"}
\]

**Slope-Intercept Form:** \( y = mx + b \) is line with slope \( m \) & \( y \)-intercept \( b \).

**Point-Slope Form** \( y - y_1 = m(x - x_1) \) is line with slope \( m \) & passing through point \( (x_1, y_1) \).

**Parallel Lines**

Same slopes

\( m_1 = m_2 \)

**Perpendicular Lines**

Slopes are negative reciprocals

\( m_1 m_2 = -1 \)

or

\( m_1 = -\frac{1}{m_2} \)

**Some Basic Facts about Numbers**

Let \( A \) and \( B \) be numbers

1) If \( A \cdot B = 0 \) \( \Rightarrow \) \( A = 0 \) or \( B = 0 \)
2) If \( \frac{A}{B} = 0 \) \( \Rightarrow \) \( A = 0 \) and \( B \neq 0 \)
**Triangles**

**Similar Triangles**

All angles match

\[ \frac{a}{b} = \frac{c}{d} \]

**Pythagorean Theorem**

\[ a^2 + b^2 = c^2 \] if and only if the triangle is right

**Defn** The distance between two points \((x_1, y_1)\) & \((x_2, y_2)\) in the xy-plane

\[ L = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \]

**Defn** The midpoint of the line segment joining points \((x_1, y_1)\) & \((x_2, y_2)\) is

\[ mp = \left( \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \]

**Circles**

**Defn** The circle w/ center \((h, k)\) & radius \(r\) is given by

\[ (x - h)^2 + (y - k)^2 = r^2 \]

Note: This equation follows immediately from the distance formula since \( r = \sqrt{(x-h)^2 + (y-k)^2} \)