Lines in the plane

Forms of eqns:
1) Ax + By + C = 0, A, B, C const. (standard form)
2) \( y - y_0 = m(x - x_0) \), line through \((x_0, y_0)\) w/slope \(m\) (point-slope form)
3) \( y = mx + b \), line through \((0, b)\) w/slope \(m\) (slope-intercept form)

Circles: Circle of radius \(r\) centered at \((x_0, y_0)\) has eqn. \( r^2 = (x-x_0)^2 + (y-y_0)^2 \Rightarrow r = \sqrt{(x-x_0)^2 + (y-y_0)^2} \)

Trig

\[
\begin{align*}
\sin \theta &= y \\
\cos \theta &= x \\
\tan \theta &= \frac{y}{x} \\
\csc \theta &= \frac{1}{\sin \theta} \\
\sec \theta &= \frac{1}{\cos \theta} \\
\cot \theta &= \frac{1}{\tan \theta}
\end{align*}
\]

Basic id's:
\begin{align*}
\sin^2 \theta + \cos^2 \theta &= 1 \\
\tan \theta + 1 &= \sec^2 \theta \\
\sin(-\theta) &= -\sin \theta, \quad \cos(-\theta) = \cos \theta
\end{align*}

Exact values for \( \theta = 0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2} \ldots \) book!

Exp & Log

\( a^r \) means “multiply \(a\) by itself \(r\) times” \( \{1, 10, 100, \ldots \} \)

For this to be in \( \mathbb{R} \), assume \( a > 0 \) or \( a < 0 \).

For \( r \) not a whole number:
\[
r = \frac{p}{q} \quad \text{for some } p, q \in \mathbb{Z}
\]

Properties:
\begin{align*}
\ln (ab) &= \ln a + \ln b \\
\ln (a^r) &= r \ln a \\
\ln (\frac{a}{b}) &= \ln a - \ln b
\end{align*}

In = log \(\text{base } e \approx 2.7182818 \ldots \)

\( \log \) means \( \log_e \) in old text (bad convention)