Lesson 2

Read Chapter 3

Lines

Lines equations

$Ax+By+C=0$

$y = mx + b$

$y = y_1 + m(x - x_1)$

Graph $y = 3x + 1$. Is $P(3, 4)$ on this line ?

Useful facts about lines

1. Two lines $L1 : y = m_1x + b_1$ and $L_2 : y = m_2x + b_2$ are parallel iff $m_1 = m_2$.
2. Two lines $L1 : y = m_1x + b_1$ and $L_2 : y = m_2x + b_2$ are perpendicular iff $m_1 = -\frac{1}{m_2}$
3. The slope of the line through the points (x_0, y_0) and (x_1, y_1) is $m = \frac{y_1 - y_0}{x_1 - x_0}$ if $x_0 \neq x_1$
4. The equation of the line through point P=(x_0, y_0) and Q=(x_1, y_1) is $y = y_0 + \frac{y_1 - y_0}{x_1 - x_0}(x - x_0)$ if $x_0 \neq x_1$ and is $y = x_1$ if $x_0 = x_1$.
5. The equation of a line through $P(x_0, y_0)$ with slope m is $y = y_0 + m(x - x0)$

Find the equation of the line through $P(1, 2)$ and parallel to the line $4x - 2y + 10 = 0$

Find the equation of the line through $P(1, 2)$ and perpendicular to the line $4x - 2y + 10 = 0$

Find the equation of the line through $P(2, 2)$ and $Q(1, 5)$

Find the equation of the line through $P(1, 2)$ and $Q(1, 5)$

Decide if the lines

$$y = 2x + 1$$

$$y = x - 2$$

intersect or not. If they do find their intersection.

Find the point on the line $y = 2x + 1$ that is closest to the point $P(3, 0)$