Homework 2

1 Find standard (normal) and parametric equations of the line passing through the point $(2, 3)$ and making an angle $\varphi = 30^\circ$ with x-axis.

2 Find an equation of the line passing through the point $(0, 1)$ and which is orthogonal to the line $y - 2x = 0$.

3 Calculate the distance between the point (x_0, y_0) and the line $y - kx = b$ using

a) geometrical methods

b) "brute force": just the minimum of the distance between the point (x_0, y_0) and an arbitrary point on the line, i.e. minimum of the function: $\sqrt{(x - x_0)^2 + (y - y_0)^2}$ with $y = kx + b$.

4 Calculate the distance between the point $A = (1, 1)$ and the line $x + 2y = 1$

5 Write down an equation of the line passing via point $A = (x_0, y_0)$ which is tangent to the circle $(x - a)^2 + (y - b)^2 = R^2$. How many solutions does this problem have?

(You could consider for simplicity only the case $a = b = 0$).

6 Find the locus formed by centres of segments of the length 1, such that their endpoints lie on the axes OX, OY.