

Problem sheet 2

Wait till Thursday before doing problem 7, this is on ellipses which we didn't have time for today.

- (1) Write an equation for the circle with centre $(3, -4)$ and radius 5.
- (2) Find the centre and radius of the circle having the given equation $x^2 + y^2 + 4y = 0$.
- (3) Describe the regions in \mathbb{R}^2 satisfying the following inequalities and pairs of inequalities:
 - (a) $x^2 + (y - 2)^2 \leq 4$.
 - (b) $x^2 + y^2 \leq 4$ and $(x + 2)^2 + y^2 \leq 4$.
 - (c) $x^2 + y^2 - 4x + 2y > 4$ and $x + y > 1$.
- (4) Write a pair of inequalities that describe that part of the interior of the circle with centre $(0, 0)$ and radius 2, and inside the circle with centre $(1, 3)$ that passes through the origin.
- (5) Write an equation for the graph obtained by shifting the graph of $y = (x - 1)^2 - 1$ downwards 1 and 1 to the right.
- (6) Find the points of intersection of the following two curves $2x^2 + 2y^2 = 5$, and $xy = 1$.
- (7) Sketch the curves represented by the following equations:
 - (a) $(x - 1)^2 + \frac{(y+1)^2}{4} = 4$.
 - (b) $(x - 1)(y + 2) = 1$.
- (8) What is the effect on the graph of an equation in x and y of replacing x with $-x$?
- (9) What is the effect on the graph of an equation in x and y by replacing x and y with $-x$ and $-y$ simultaneously?
- (10) Sketch the graph of $|x| + |y| = 1$.