

MA10103: Foundation Mathematics I

PROBLEM SHEET 7

Please, do all questions and hand in solutions to the starred questions at the lecture on *Monday 19th November*.

1. Find the distances between the following pairs of points:

$$(1, 6) \text{ and } (3, 5); \quad (4, 8) \text{ and } (-3, -4); \quad (2, 2) \text{ and } (7, 14).$$

Also, find the midpoints of the lines between the pairs of points above.

- 2*. Find the equation of the line that:

- (a) goes through $(2, 1)$ and has gradient 3;
- (b) goes through $(1, 4)$ and $(-3, 2)$;
- (c) is perpendicular to the line $y = 3x + 2$ and goes through $(1, 5)$;
- (d) is parallel to the line $3x + 2y = 7$ and goes through $(0, 0)$.

- 3*. Find the point(s) of intersection of the following pairs of lines.

$$y = 3x + 2 \text{ and } y = 7x - 6; \quad y = -3x - 4 \text{ and } y = 2x + 3.$$

4. Find the point(s) of intersection of the line $y = x + 2$ with the curve $x^2 + y^2 = 4$ (which is a circle).
5. The corners (or vertices) of a triangle are given by the points $P(0, 0)$, $Q(10, 2)$ and $R(3, 8)$.
- (a) Let U be the midpoint between P and Q , V be the midpoint between Q and R , and W be the midpoint between R and P . Calculate the coordinates of U , V and W .
 - (b) Let f be the line joining U and R , g be the line joining V and P , and h be the line joining W and Q . Find the equations of the lines f , g and h .
 - (c) Find the point of intersection of the following pairs of lines:

$$f \text{ and } g; \quad g \text{ and } h; \quad f \text{ and } h.$$

What is striking here?

Please turn over!

- (d) Take (one of) the point of intersection calculated in (c) and call it G . Calculate the following distances:
- between G and U and between G and R ;
 - between G and V and between G and P ;
 - between G and W and between G and Q .

What is striking here?

6. *Repetition-Question:* You put the amount of GBP 550.– on a savings account with an interest rate of 5% per year. At the end of each year, the interest is added to your account. So, after one year you have $\pounds 550 + 0.05 \times \pounds 550 = 1.05 \times \pounds 550 = \pounds 577.50$ on your savings account.
- (a) How much money do you have on your savings account after 5 years.
- (b) After how many years has your money (at least) doubled? When has it tripled?