

MA10103: Foundation Mathematics I

PROBLEM SHEET 1

You are required to do all questions on the problem sheets and to hand in your solutions to the starred questions.

In the first week we will do questions 1-4 below in the first tutorial.

Please hand in your solution to the starred questions in the lecture on Monday 8th October. You will have an opportunity to discuss the solutions to any of the questions in the tutorial on Monday 8th October.

Web page: <http://www.maths.bath.ac.uk/~bs259/ma10103/>

1. Evaluate the following, writing the answer in its lowest terms (i.e., with the smallest numerator and denominator):

$$\frac{2}{7} \times \frac{3}{2}; \quad \frac{1}{3} + \frac{1}{5}; \quad \frac{3}{4} \times \frac{2}{4}; \quad \frac{2}{7} + \frac{4}{9}; \quad \frac{3}{4} \div \frac{3}{7}; \quad \frac{4}{11} - \frac{1}{7}; \quad \frac{5}{54} \div \frac{25}{18}$$

2. Write the following to the requested number of decimal places.

(a) $\sqrt{2} = 1.414213562\dots$ to 3 decimal places.

(b) $\pi = 3.141592654\dots$ to 4 decimal places.

(c) $g = 9.80665 \text{ m s}^{-2}$ to 1 decimal place.

(d) g to 4 decimal places.

Rewrite $\sqrt{2}$, π , and g to 3 significant figures.

Write $c = 299792458 \text{ m s}^{-1}$ to 3 significant figures.

3. Write the following numbers in standard index form.

$$0.025; \quad 937.2; \quad 0.000073; \quad 324569.3; \quad 1609.$$

4. Write the following rational numbers as decimals.

$$\frac{1}{5}; \quad \frac{1}{25}; \quad \frac{1}{125}; \quad \frac{1}{3}; \quad \frac{1}{30}; \quad \frac{1}{300}$$

Please turn over!

5*. Simplify the following expressions as much as you can:

$$3 \times 2x; \quad 4 \times 7x; \quad 3x \times 2x; \quad 6ab \times 3ba; \quad 3x \div 2x; \quad (6x)^2 \times 4x; \quad \frac{21xy}{7y};$$
$$3x + 4y + 2x; \quad 3x^2 + 2 - x^2; \quad (2x)^2 - 3x^2; \quad a(b - c) - c(a - b); \quad x^2 + (4x - 3)2x.$$

6*. Multiply out the following brackets:

$$(2x + 3)(x - 1); \quad (3a + b)(4a + 2); \quad (t - 3)(t + 2); \quad (t - 11)(t + 11); \quad (s + 3)(s + 3);$$
$$(k - 3)(k - 3); \quad (2k - 3)(2k - 3); \quad (ax + b)^2; \quad (ax - b)^2; \quad (ax + b)(ax - b).$$

7. Factorise the following quadratics using integers.

$$x^2 + 8x + 15; \quad x^2 + 7x + 6; \quad x^2 - 10x + 9; \quad x^2 + 8x + 12; \quad x^2 + 5x - 14; \quad x^2 - 4x - 5;$$
$$x^2 + 9x + 14; \quad x^2 - 9; \quad x^2 + 4x + 4; \quad x^2 - 3x - 18; \quad x^2 - 16; \quad 2x^2 - 3x + 1; \quad 9x^2 - 6x + 1;$$
$$9 + 6x + x^2; \quad x^2 + 2ax + a^2.$$

8. Expand the following.

$$(x - 3)(x^2 + 2x + 1); \quad (x^2 + 2x + 3)(x^2 - 3x + 5); \quad (x - 1)(x + 1)(2x - 4);$$
$$(3a + 2q)(4x - 3a + z); \quad (x - 3)^3; \quad (2x + 3)^3.$$