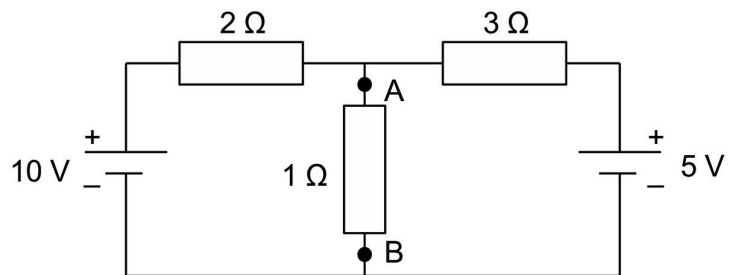# Year 1 Assessed Problems

Semester 2

Assessed Problems 4

SOLUTIONS TO BE SUBMITTED ON CANVAS BY

Wednesday 19th February 2025 at 17:00

Electric Circuits,
Problem Sheet 2, Week 4

1. Use Kirchhoff's laws to find the current in the 1Ω resistor in the circuit shown below.

Continuous Assessment II

Continuous Assessment for Chaos is centred around two analogue exam questions which can be found on canvas.

3. For the oscillations centred around $x=1$ show that approximately, with $x=1+X$

$$\frac{d^2X}{dt^2} + X = -\frac{3}{4}R^2\left[1 + \cos 2(t - t_0)\right] - \frac{1}{8}R^3\left[\cos 3(t - t_0) + 3\cos(t - t_0)\right] \qquad [\mathbf{5}]$$

4. Solve this approximation to provide a supposedly more accurate representation for the trajectory. $[\mathbf{5}]$

Maths for Physicists 1B Assessed Problem 2

(a) Find the stationary points of the function

$$f(x, y) = x^3 - 12xy + 105x + 2y^2,$$

and classify them as maxima, minima or saddle points. [**5**]

(b) Find the minimum value of the function

$$f(x, y, z) = x^3 + y^3 + z^3$$

subject to the constraint condition $x^2 + 2y^2 + 3z^2 = 1$ where x, y, z are positive and non-zero. [**5**]