

1. **(T3.5 - E) (CI)** Solve the following trig equations on the domain of  $0 < x < 2\pi$ .

*(Cirrito 10.2.2, p332)*

- a.  $2\cos^2(x) + 3\sin(x) = 0$
- b.  $2\sin^2(x) - 3\cos(x) = 0$

2. **(GT 3.5 - E) (CI)** For each of the following angles, determine the value of the sin, cos, and tan ratios.

*(Cirrito 10.1, p.315)*

- a.  $\frac{\pi}{3}$
- b.  $\frac{5\pi}{3}$
- c.  $-\pi$
- d.  $\frac{5\pi}{6}$
- e.  $\frac{2\pi}{3}$
- f.  $-\frac{11\pi}{6}$

3. A poll of 20 students was taken at CAC to see whether they support banning the sale of plastic water bottles on campus. It is known that approximately 60% of the students support the ban.

*(Cirrito 16.3.4, p544)*

- a. What is the probability that 5 students support the ban?
- b. What is the probability that none students support the ban?
- c. What is the probability that at least 2 students support the ban?
- d. How many students are expected to support the ban?

4. **(F2.1, F2.2, F2.4 - R) (CI)** Given the function  $g(x) = x^2 + 2x + 3$ , where  $x > -1$ .

*(Cirrito 5.4, p148)*

- a. Use calculus to find the vertex of  $g(x)$ .
- b. Hence, or otherwise, find the inverse,  $g^{-1}(x)$ .
- c. On the same set of axes, sketch the graphs of  $g(x)$  and  $g^{-1}(x)$ , labeling all intercepts.
- d. Will there exist a value of  $x$  such that  $g(x) = g^{-1}(x)$ ? If so, find its value. If not, explain why not.

5. **(F2.5 - R) (CI)** For the rational function  $r(x) = \frac{2x-5}{x-2}$ ,  $x \neq 2$ , determine:

*(Cirrito 5.3.5, p144)*

- a. the equation(s) of the asymptote(s) and the intercepts of  $r(x)$ .
- b. Evaluate  $\lim_{x \rightarrow \infty} r(x)$ .
- c. Rewrite the equation of  $r(x)$  in the form  $r(x) = a + \frac{b}{x-2}$ ;  $a, b \in \mathbb{Z}$ .
- d. Hence, determine the transformations that were applied to  $y = \frac{1}{x}$  to create  $r(x)$ .

6. **(P5.6 - R) (CI)** Two events,  $A$  and  $B$ , are such that  $P(A) = \frac{9}{16}$  and  $P(B) = \frac{3}{8}$  and  $P(A | B) = \frac{1}{4}$ . Find the probability that:

*(Oxford 3.4, p85)*

- Both events will happen.
- Only one of the events will happen
- Neither of the events will happen
- Event  $A$  happens given that both events happen.

7. **(C5.3 - N) (CI)** For the function  $f(x) = x^3 + x^2 - x - 1$ , determine:

*(Cirrito 20.2, p649)*

- the equation of the derivative of  $f(x)$ .
- the zeroes of  $f'$ .
- Hence or otherwise, find the coordinates of the **stationary points** of  $f$ .
- Hence or otherwise, find the **intervals of increase and decrease** of  $f$ .
- Sketch a graph of  $f$ . Then use your calculator and graph  $f$  and compare.

8. We are going to investigate the power rule for determining the equations of derivatives. Using your calculator, or desmos, do the following:

- Let  $f(x) = \sqrt{x} = x^{\frac{1}{2}}$ . Graph the function  $\Rightarrow$  put that equation into  $y_1$  in your calculator.
- Then in  $y_2$  write down what you think the equation of the derivative function should be.
- In  $y_3$  you will type in 'nDeriv' then 'x' then  $y_1$  then 'x' again.
- Graph the functions. If you did it correctly,  $y_2$  and  $y_3$  should match. If not, go back and figure out what you did wrong in calculating your derivative.
- Repeat this exercise for the following functions:

i.  $g(x) = \sqrt[3]{x}$

ii.  $g(x) = \frac{1}{x}$

iii.  $g(x) = \frac{1}{x^2}$