1. **(F2.4, F2.10; CA)** Rumours of an imminent take-over by a large electronics company has forced the value of shares of Smith Electronics to rise. Unfortunately, one week later, Smith Electronics declared that the take-over would **not** happen. Consequently, the value of the shares of Smith Electronics now has changed and their value is now modelled by the equation below, where *t* is time in the weeks since the rumour started and *V*(*t*) is value in cents.
(Oxford 2.5, p.53)

$$V(t) = \frac{400}{t^2 - 2t + 2}$$

   a. Sketch the graph of the function *V*.
   b. What was the value of the shares in Smith Electronics before the rumour started?
   c. What is the maximum value that Smith Electronics reaches?
   d. What is the **average rate of change** of the value of shares between week 3 and week 5?
   e. What is the **instantaneous rate of change** of the value of shares in week 3
   f. Mr Dunham bought shares in Smith Electronics before the rumour started. If he is prepared to sell them at 50% profit, when should he sell his shares?

2. **(GT3.4; CI)** Sketch a graph of the following trigonometric functions and label all extrema and intercepts and if necessary all asymptotes on two periods of a positive domain:
(Cirrito 16.3.2, p341)
   a. The function $g(x) = -2\cos(3x) + 2$
   b. The function $h(x) = \sin\left(\frac{1}{2}\left(x - \frac{\pi}{3}\right)\right)$

3. **(GT3.3; CI)** Given that the sine ratio of an angle is ⅝ (i.e. sin(*x*) = ⅝) and that $0° \leq x \leq 90°$:
(Oxford 13.2, p.454)
   a. Draw a right triangle and label all known information about the angle.
   b. Determine the cosine and tangent ratios of the angle.
   c. Use the information in the triangle to verify the identity $\sin^2(x) + \cos^2(x) = 1$.

4. **(GT3.3; CI)** Given that sin(*x*) = ¾ and that $0 \leq x \leq \frac{\pi}{2}$, find the exact values of:
(Oxford 13.3, p.456)
   a. cos(*x*) b. cos(2*x*) c. sin(2*x*) d. tan(2*x*)

5. **(F2.2; CA)** Given the function $f(x) = \frac{1}{2}x^3 - 3x^2 - 8x + 4$.
(Cirrito 18.2, p.588)
   a. Determine the stationary points of this function
   b. Hence write down the intervals of increase and decrease for $f(x)$.
   c. On what domain is $f(x) > 0$?
   d. Given another function $g(x) = x^2 - 3x + 4$, determine the solution to $f(x) = g(x)$.

6. **(GT3.7; CI)** Determine the period of the following sinusoidal functions:
(Oxford 13.4, p.462)
   a. $y = 3sin(2x) + 4$
   b. $y = -\frac{2}{3}cos(\frac{\pi}{4}x - 4)$
   c. $y = sin(\frac{7}{4\pi}x)$
   d. $y = 2cos(\frac{13}{47}x - 3) - 1$

7. **(F2.6; CI)** Given the function $g(x) = \log_2(x + 1)$, determine the following:
(Cirrito 5.4.2, p164)
   a. The domain and range of g.
   b. The intercept(s) of g.
   c. The equation of g^{-1}.
   d. The simplified equation of $fog(x)$ if $f(x) = 2^x - 1$.
   e. Given your answer to (d), what conclusion can you make about $f(x)$?

8. **(GT3.5; CI)** Factor the following expressions:
(Oxford 2.1, p.34)
   a. (i) $1 - \cos^2 x$ (ii) $1 - 4\sin^2 x$ (iii) $\sin x - \sin^2 x$
   b. (i) $\sin^2 x - \cos^2 x$ (ii) $\cos^2 x + 2\cos x + 1$ (iii) $\sin^2 x - 2\sin x + 1$