1. **(C 5.4 - N) (CI)** Determine the equations of the lines that are (i) tangent to and (ii) normal to the following functions at the specified points:
   (Cirrito 20.1, p.646)
   a. $y = 3x^2 - 4x$, at the point $(1, -1)$.
   b. $y = 1 - 6x - x^2$, at the point $(-3, 10)$.

2. **(F 2.5, C 5.8 - R,E) (CI)** A quadratic function is given by the equation $f(x) = x^2 + 4x + B$.
   (Cirrito 5.4.2, p.157)
   a. Determine the value of B if $f^{-1}(x) = -2 + \sqrt{x-6}$.
   b. Perform the following compositions:
       i. $f \circ f^{-1}(x)$
       ii. $f^{-1} \circ f(x)$.
       iii. Describe what happens and explain why.
   c. At what point would you expect the tangent line drawn to the quadratic function to have a zero slope? Explain why.

3. **(SP 4.7 - N) (CA)** For a discrete random variable, X, the probability distribution is defined by the equation :
$$P(X = x) = f(x) = \begin{cases} kx & x = 1, 2, 3, 4, 5 \\ k(10 - x) & x = 6, 7, 8, 9 \end{cases}$$
   (Cirrito 16.1, p.527)
   Find:
   a. The value of the constant, k.
   b. Hence, find $P(X = 3)$
   c. Find the mean (now called the **expected value** of X)

4. **(GT 3.8 - R) (CI)** Solve the following equations on the domain of $0 < x < 2\pi$.
   (Cirrito 10.4, p.351)
   a. $\sqrt{2}\cos(x) - 1 = 0$
   b. $\sqrt{2}\sin(2x) + 1 = 0$

5. **(C 6.1 - N) (CI)** The function $y = x^2 + 3x$ has a tangent line drawn at $x = a$ where the slope of the tangent line is 5. Find the value of a.
   (Cirrito 20.1, p.646)

6. **(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. $\frac{4\pi}{3}$ c. π

7. **(C 5.7, 5.8 - N) (CI)** For the function $f(x) = x^4 - 4x^3$, determine:
   (Cirrito 20.2, p.649)

   a.   the equation of the second derivative of $f(x)$, that is $\frac{d^2y}{dx^2}f(x)$.
   b.   the zeroes of $\frac{d^2y}{dx^2}f(x)$.
   c.   Hence or otherwise, find the coordinates of the **inflection points** of f.
   d.   Hence or otherwise, find the **intervals of concavity** of f.
   e.   Sketch a graph of f. Then use your calculator and graph f and then compare.

8. **(C 5.7, 5.8 - N) (CI)** Here is a graph of a function. Draw graph of the first derivatives of this function.
   (Cirrito 19.2, p.609)