1. **(C5.4 - N) (CI)** Determine the equations of the specified lines that are *tangent* and *normal* to the following functions at the specified points. (Reminder: a ***normal line*** is perpendicular to a ***tangent line***)
(Cirrito 20.1, p.646)
   a. $g(x) = x^2(2x - 1)(x + 3)$ at the point where $x = -1$.
   b. $f(x) = 2\sqrt{x} - \frac{1}{2}x$ at the point where $x = 4$.
   c. $h(x) = \frac{2}{x} - \frac{2}{x^2}$ at the point where $x = -1$.

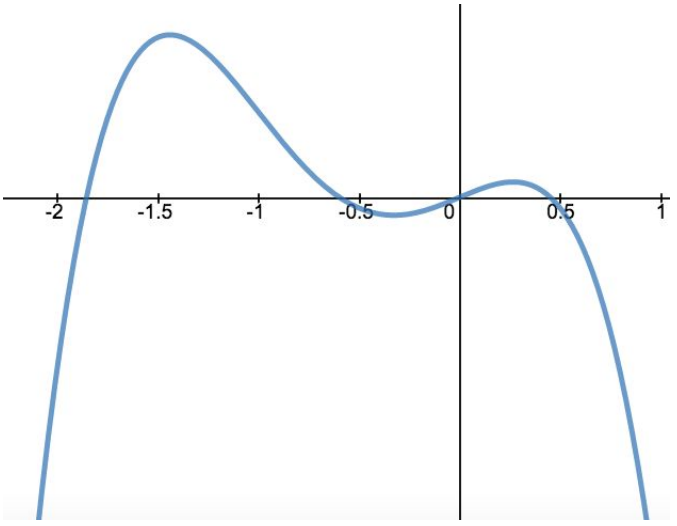
2. **(C5.4 - N) (CA)** At what x value(s) does the curve $y = \frac{1}{2}x^4 + \frac{4}{3}x^3 - x^2 - 6x + 7$ have a tangent line that is perpendicular to the line $2y - x + 6 = 0$?
(Cirrito 20.1, p.646)

3. **(C5.4 - N) (CI)** The tangent line to a curve $y = f(x)$ at $x = 2$ passes through the points (0,-20) and (5,40). What are the values of $f(2)$ and $f`(2)$?
(Cirrito 20.1, p.646)

4. **(C5.4 - N) (CI)** The tangent line to a curve $y = f(x)$ at $x = 1$ passes through the point (4,9). If $f(1) = 3$, then what is the value of $f`(1)$?
(Cirrito 20.1, p.646)

5. **(C5.4 - N) (CI)** The tangent line to a curve $y = g(x)$ at $x = 3$ has an x-intercept at $\frac{10}{3}$ and a y-intercept of -10. What are the values of $g(3)$ and $g`(3)$?
(Cirrito 20.1, p.646)

6. **(C5.7 - N) (CI)** Here is a graph of a function. Sketch graphs of the ***first*** and ***second*** derivatives of this function.
(Cirrito 19.2, p.609)



7. **(C5.4 - N) (CI)** For $g(x) = \frac{1}{4}x^4 - \frac{4}{3}x^3 - \frac{5}{2}x^2 + 1$ determine:
(Cirrito 20.2, p.649)
   a. the equation of the derivative of $g(x)$.
   b. the zeroes of $g'(x)$.
   c. Hence or otherwise, find the coordinates of the stationary points of g.
   d. Hence or otherwise, find the intervals of increase and decrease of g.
   e. Sketch a graph of g. Then use your calculator and graph g and compare.

8. **(C5.4 - N) (CI)** For the function $f(x) = -x^4 - 2x^3 + 3x$ determine:
(Cirrito 20.2, p.649)
   a. the equation of the second derivative of $f(x)$.
   b. the zeroes of $f''(x)$.
   c. Hence or otherwise, find the *x*-coordinates of the inflection points of *f*.
   d. Hence or otherwise, find the intervals of concavity of *f*.
   e. I have included a graph of the **derivative of *f* (*x*)**. Use it to help you sketch a graph of f. Then use your calculator and graph f and then compare.