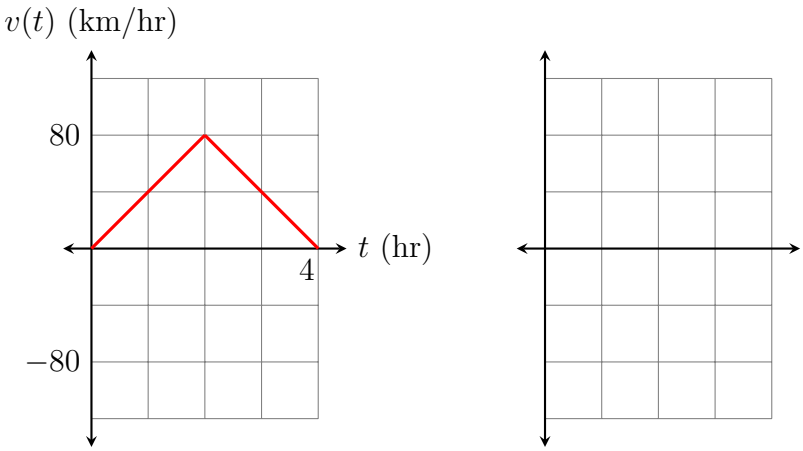
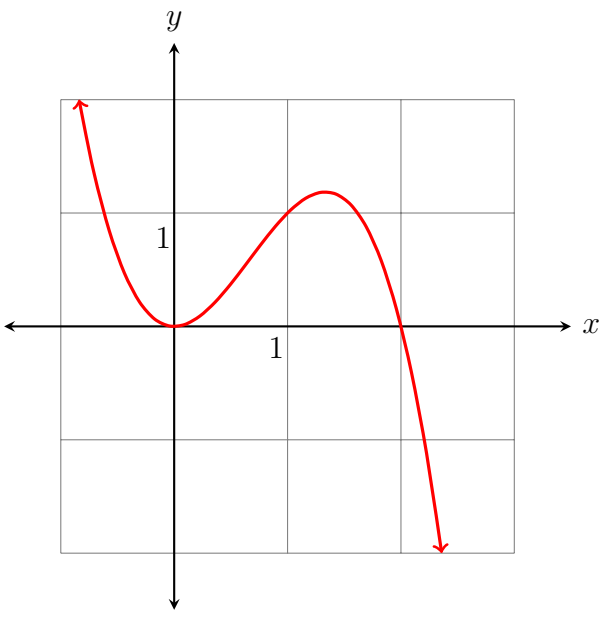
1. You are given a displacement graph below. Draw the corresponding velocity graph on the blank grid. Label axes carefully!

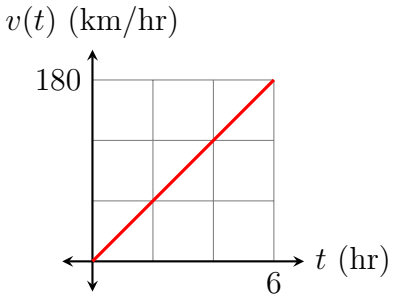


Write a brief sentence describing this journey.

2. Below is a graph of the function $f(x) = 2x^2 - x^3$. Find an equation of the tangent line in the form $y = mx + b$ at $x = 1$. You can use the graph to verify your answer, but you have to use calculus to find the equation. You may use the fact that $f'(x) = 4x - 3x^2$.



3. Below is a graph of a velocity curve. Find an equation for the displacement curve.



4. Using the definition of the derivative, find $f'(x)$ if $f(x) = 2 - x$.

5. Find the derivatives of the following functions.

   (a) $h(x) = x\sqrt{x}$

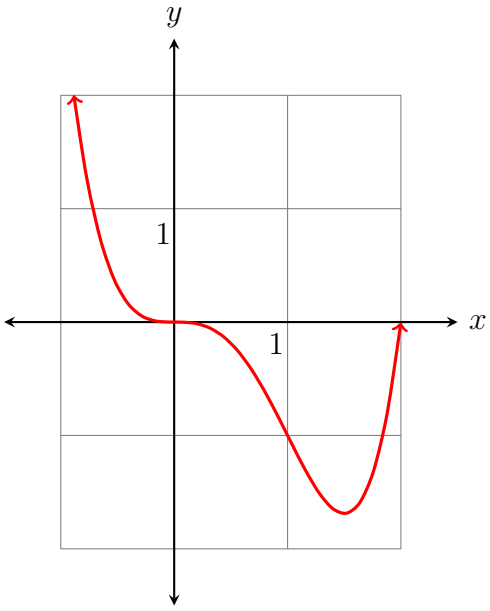
   (b) $h(x) = x\sin(x)$

(c) $h(x) = \dfrac{\cos(x)}{x^2}$

(d) $h(x) = \sin(x^2 - 1)$

6. Suppose $f(x) = \cos(x) - x^5$. Find $f''(x)$.

7. Below is a graph of $f(x) = x^4 - 2x^3$. You are given that $f'(x) = 4x^3 - 6x^2$ and $f''(x) = 12x^2 - 12x$. By making the appropriate sign chart, find all inflection points on this curve.



8. Fill in the blanks with either $f(x)$, $f'(x)$, or $f''(x)$.

   (a) To make a sign chart to find inflection points, we use _____.

   (b) To find the y-value for a local minimum, we use _____.

   (c) To find where a function is increasing or decreasing, we use _____.