
IN-CLASS ACTIVITY : DERIVATIVES V

1. Determine all points on the graph of $f(x) = x^3 + x^2 - x - 1$ for which the tangent line is horizontal.
2. Find a quadratic polynomial such that $f(1) = 5$, $f'(1) = 3$ and $f''(1) = -6$.
3. A car driving along the freeway with traffic has travelled $s(t) = t^3 - 6t^2 + 9t$ meters in t seconds.
 - i) Determine the time when the velocity of the car is 0.
 - ii) Compute the acceleration of the car when its velocity is 0.
4. Find the equation of the tangent line to the graph of $f(x) = 2x^3 + 4x^2 - 5x - 3$ at $x = -1$.
5. Compute the derivative of the following functions
 - i) $f(x) = x^7 + 10$
 - ii) $f(x) = 5x^3 - x + 1$
 - iii) $f(x) = 4x^2 - 7x$
 - iv) $f(x) = 8x^4 + 9x^2 - 1$
 - v) $f(x) = x^4 + \frac{2}{x}$
 - vi) $f(x) = \sqrt[3]{x^2} + \frac{1}{x}$
6. The function $s(t) = 2t^3 - 3t^2 - 12t + 8$ represents the position of a particle moving along a horizontal line. Find the time intervals when the object is speeding up or slowing down.