

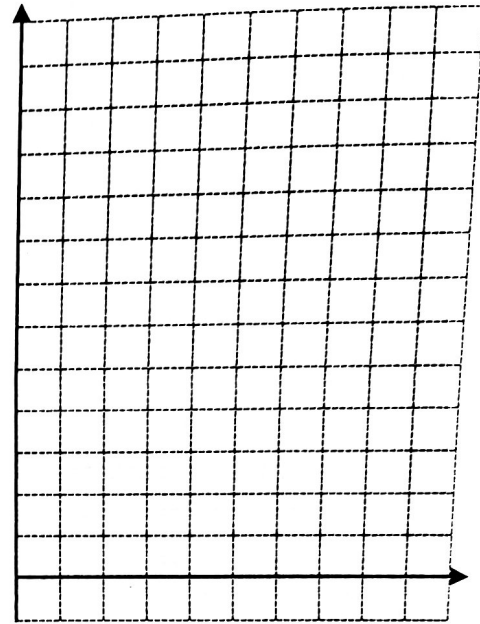
MCV 4U – Grade 12 Calculus & Vectors, University Preparation

1. [K3A3C2] The position of a particle in $s(t)$ metres after t seconds is given by $s(t) = t^3 - 7.5t^2 + 12t + 7$.

a) Find the initial position.

b) Find the turning points.

c) Graph the position.



d) Find the average velocity from $t = 1$ second to $t = 3$ seconds.

e) When is the particle speeding?

f) Find the velocity when the acceleration is 15 m/s^2 .

2. [K3A2] For $f(x) = x^3 - 5x^2 - 8x + 2$, determine the

a) $f'(x)$

b) $f(-2)$

c) $f'(-2)$

d) the equation of the tangent at $x = -2$

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3. [K6] Find the derivative.

a) $y = (5x^2 - x + 1)(x + 2)$

b) $y = (2 + 3x^2 - x^3)^5$

c) $y = \frac{4x+1}{x^3-2}$

4. [K3A3C2] A company sells 150 movie DVDs per month at \$20 each. Market research has shown that sales will decrease by 5 DVDs per month for each \$0.75 increase in price. The cost of producing x DVDs is $C(x) = -0.003x^2 + 4x + 300$. Determine the

a) price function

b) revenue function and
marginal revenue function

c) maximum revenue

d) profit function

e) marginal profit function

f) maximum profit

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5. [K3A3] Find the minimum and maximum revenue from selling x DVD players in dollars, given by the equation $R(x) = 450\sqrt{x} - 3x, 0 \leq x \leq 10000$. Sketch the graph of revenue function.

6. [T4] Find the derivative of $y = (x^3 - x)^2 \cdot \sqrt[4]{(3x^2 - 2)^3}$.

7. [T4] Find the 100th derivative of $y = \frac{1}{ax+b}$.

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8. [K2C2] State the three different ways to find the derivative of $y = \frac{4x^3 - 3x^2 + x - 1}{x}$. Determine the derivative using each method.

9. [K7A9] Find the derivative.

a) $y = -2\sqrt[3]{(4x^2 - 1)^2}$

b) $y = \frac{(3x^2 - 4)^2}{(6x + 5)^4}$

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c) $y = \left(\frac{x^2-4}{x+5}\right)^3$

d) $y = \frac{(3x-1)(x+1)^5}{x-3}$

10. [K4] Find $\frac{dy}{dx}$ at $x = 2$ if $y = \sqrt{u}$ and $u = 3x^2 - 5x + 2$.