L2 – The Product Rule Unit 1
MCV4U
Jensen

Part 1: Proof of the Product Rule

The Product Rule:

If $P(x) = f(x)g(x)$, then $P'(x) =$

"Derivative of the first times the second plus derivative of the second times the first"

Part 2: Apply the Product Rule

Example 1: Use the product rule to differentiate each function.

a) $P(x) = (3x - 5)(x^2 + 1)$

b) $y = (2x + 3)(1 - x)$

Example 2: Find $h'(-1)$ where $h(x) = (5x^3 + 7x^2 + 3)(2x^2 + x + 6)$

Example 3: Find the derivative of $g(x) = (x-1)(2x)(x^2+3)$

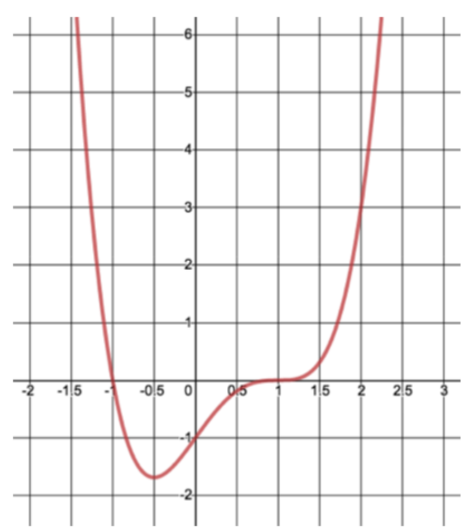
Consider $(x-1)(2x)$ as the 1st function

Consider $x^2 + 3$ as the 2nd function

$\frac{d}{dx} 1^{st} =$

Note: In example 3, expanding first would probably be easier, but that is not always the case such as with $h(x) = (2x) \cdot \sqrt{x+1}$

Example 4: Determine an equation for the tangent to the curve $y = (x^2 - 1)(x^2 - 2x + 1)$ at $x = 2$.



Example 5: Student council is organizing its annual trip to an out-of-town concert. For the past 3 years, the cost of the trip has been \$140 per person. At this price, all 200 seats on the train were filled. This year, student council plans to increase the price of the trip. Based on a student survey, council estimates that for every \$10 increase in price, five fewer students will attend the concert.

a) Write an equation to represent revenue, R, in dollars, as a function of the number of $\$10$ increases, n.

b) Determine an expression, in simplified form, for $\frac{dR}{dn}$ and interpret it for this situation.

c) Determine when $R'(n) = 0$. What information does this give the manager?