

**MAT251 Quiz 3 – Due 10pm tonight 2-5-26, no exceptions. PDF only.**

1. Use the product rule to find the derivative of  $y = (x^2 + 3x + 1)(2x^3 - \sqrt{x})$ . You do not need to simplify it. Leave it “spread out”.
2. Use the quotient rule to find the derivative of  $y = \frac{x^3+2x+1}{4x^2+x}$ . You do not need to simplify it. Leave it “spread out”.
3. Find the derivative of  $y = \frac{x^2+2x-8}{x-2}$ . In this case, simplify it completely and state any restrictions on  $x$ .
4. Use the Chain Rule to find the derivative of  $y = (x^3 + 2x^2 + x)^5$ .
5. Use the Chain Rule to find the derivative of  $y = \sqrt{x^2 + 4}$ . Simplify it.

Key:

1.  $y' = (x^2 + 3x + 1) \left( 6x^2 - \frac{1}{2\sqrt{x}} \right) + (2x^3 - \sqrt{x})(2x + 3)$
2.  $y' = \frac{(4x^2+x)(3x^2+2) - (x^3+2x+1)(8x+1)}{(4x^2+x)^2}$
3.  $y' = 1, x \neq 2$ .
4.  $y' = 5(x^3 + 2x^2 + x)^4(3x^2 + 4x + 1)$
5.  $y' = \frac{x}{\sqrt{x^2+4}}$