

Name: *Maya Rodriguez***Student ID:** *S00482917***5.5/10**Find dy/dx . Show your work. Each problem is worth 2 points.

1. $y = 3x^4 - 5x^2 + 7x - 2$

✓ 2/2

$$y' = 12x^3 - 10x + 7$$

2. $y = x^2 \sin x$

✓ 2/2

$$\text{product rule: } (x^2)' \sin x + x^2 (\sin x)'$$

$$y' = 2x \sin x + x^2 \cos x$$

3. $y = \sin(x^2)$

✗ 0/2

$$\text{product rule? } (\sin x)(x^2)$$

$$y' = \cos x \cdot x^2 + \sin x \cdot 2x$$

$$y' = x^2 \cos x + 2x \sin x$$

 $\sin(x^2)$ is a COMPOSITION, not a product.Chain rule: $y' = \cos(x^2) \cdot 2x$

4. $y = (x^3 + 1) / x^2$

 $\frac{1}{2}$ 1/2

$$\text{quotient rule: } (x^2 \cdot 3x^2 - (x^3+1) \cdot 2x) / x^4$$

$$= (3x^4 - 2x^4 + 2x) / x^4$$

$$= (x^4 + 2x) / x^4 = 1 + 2/x^3$$

Sign error: $-(x^3+1) \cdot 2x = -2x^4 - 2x$ Correct: $1 - 2/x^3$

5. $y = (x^2 + 1)^3$

 $\frac{1}{4}$ 0.5/2

$$= (x^2+1)(x^2+1)(x^2+1)$$

$$\text{product rule: } 2x(x^2+1)(x^2+1) + (x^2+1) \dots$$

ran out of time

Chain rule again! $y' = 3(x^2+1)^2 \cdot 2x = 6x(x^2+1)^2$

Setup shows effort, but this approach is too slow on an exam.

Instructor comment: $\text{Maya, you used the product rule where the chain rule was needed on \#3 and \#5.}$ $\text{Please come to office hours (Tue/Thu 2-3 PM) before Midterm 1 on Oct 1. - D.O.}$