

Name: _____

Each problem is worth 10 points; you must show all your work (excluding arithmetic) for full credit.

1. Find the derivative:

$$\frac{d}{dx} [(5x^2 - 2)(4x + 3)]$$

- (a) By using the product rule, then simplifying
- (b) By simplifying first and then using the power rule

Simplify both answers and check that they agree.

- Suppose a farmer sells jicamas for \$50/bushel. If his fixed costs are \$50,000 and his variable costs to produce q bushels are $5q + \frac{500}{q+1}$, find $MAP(5000)$. Give units and interpret your answer.

3. Find the derivative:

$$\frac{d}{dx} \frac{\sqrt{x} - 1}{\sqrt{x} + 1}$$

4. Suppose Sidney runs over a hornet nest with a lawnmower and runs away along a straight sidewalk (occasionally turning back to check if the swarm is catching up). Sidney's distance from the nest t seconds later is given by $D(t) = t^3 - 21t^2 + 120t$, where D is the distance from the nest in inches. Determine when Sidney is:
- (a) Heading towards the nest
 - (b) Moving away from the nest
 - (c) Speeding up
 - (d) Slowing down

5. Find the derivative:

$$\frac{d}{dx} (5x^2 - 2)^2$$

- (a) Using the chain rule or the generalized power rule
- (b) By expanding the square and then using the power rule

Simplify both answers and check that they agree.

6. Find the derivative:

$$\frac{d}{dx} \frac{(3x^2 - 6x + 4)^{11}}{\sqrt{10x - 2}}$$