

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Find an equation of the tangent line to the graph of $f(x) = \left(\frac{x}{x+4}\right)^2$ at $x = 4$.

2. Find an equation of the tangent line to the graph of $f(x) = \frac{1}{\sqrt{2x^3 - 3x - 1}}$ at $x = 2$.

3. Multiple licenses to George's[®] Miraculous Software can be bought at a total cost of

$$C(x) = 24x^{4/3} \quad \text{dollars for } x \text{ licenses.}$$

- (a) Find the marginal cost at x licenses.

- (b) Find the marginal cost at $x = 64$ and interpret your answer.

4. Consider the function $f(x) = \frac{3x + 6}{x - 2}$.

(a) Find the domain of f .

(b) Find the vertical and horizontal asymptotes.

(c) Compute the first derivative and find the critical points.

(d) Create the sign table for the first derivative and show intervals of monotonicity and relative extrema.

(e) Roughly sketch the graph of $y = f(x)$, clearly labeling all points of interest.

5. Consider the function $f(x) = x^3 - 12x + 4$.

(a) Compute the first derivative and find the critical points.

(b) Compute the second derivative and find its “critical” points.

(c) Create the combined sign table for the first and second derivative and show intervals of monotonicity, relative extrema, intervals of concavity and inflection points.

(e) Roughly sketch the graph of $y = f(x)$, clearly labeling all points of interest.