

Group Exam 3

Name: KEY

Math 141-2, Calculus I

Name of group member: _____

Professor McNicholas

Name of group member: _____

Show your work and make sure your answers are well organized, easy to follow, and properly explained.

Problem 1:

Find the equation of the tangent line to $f(x) = \ln(3x^2 \ln(x))$ at $x = 2$

$$f'(x) = \frac{1}{3x^2 \ln(x)} \left[6x \ln(x) + \frac{3x^2}{x} \right]$$

$$= \frac{1}{3x^2 \ln(x)} [6x \ln(x) + 3x]$$

$$f'(2) = 1.72134 \leftarrow \text{slope of tangent line}$$

$$(2, f(2)) = (2, \ln(3 \cdot 4 \cdot \ln(2))) = (2, 2.118) \leftarrow \text{point where line is tangent to the function } f(x)$$

EQN of tangent line:

$$(y - 2.118) = 1.72134(x - 2)$$

$$y = 1.72134x - 1.325$$

Signature line: _____

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Problem 2:

Given $B = P(r^2 + 3r - 7)^t$

(a) Find $\frac{dB}{dr} = P \cdot t(r^2 + 3r - 7)^{t-1} (2r + 3)$

(b) Find $\frac{dB}{dt} = P(r^2 + 3r - 7)^t \cdot \ln(r^2 + 3r - 7)$

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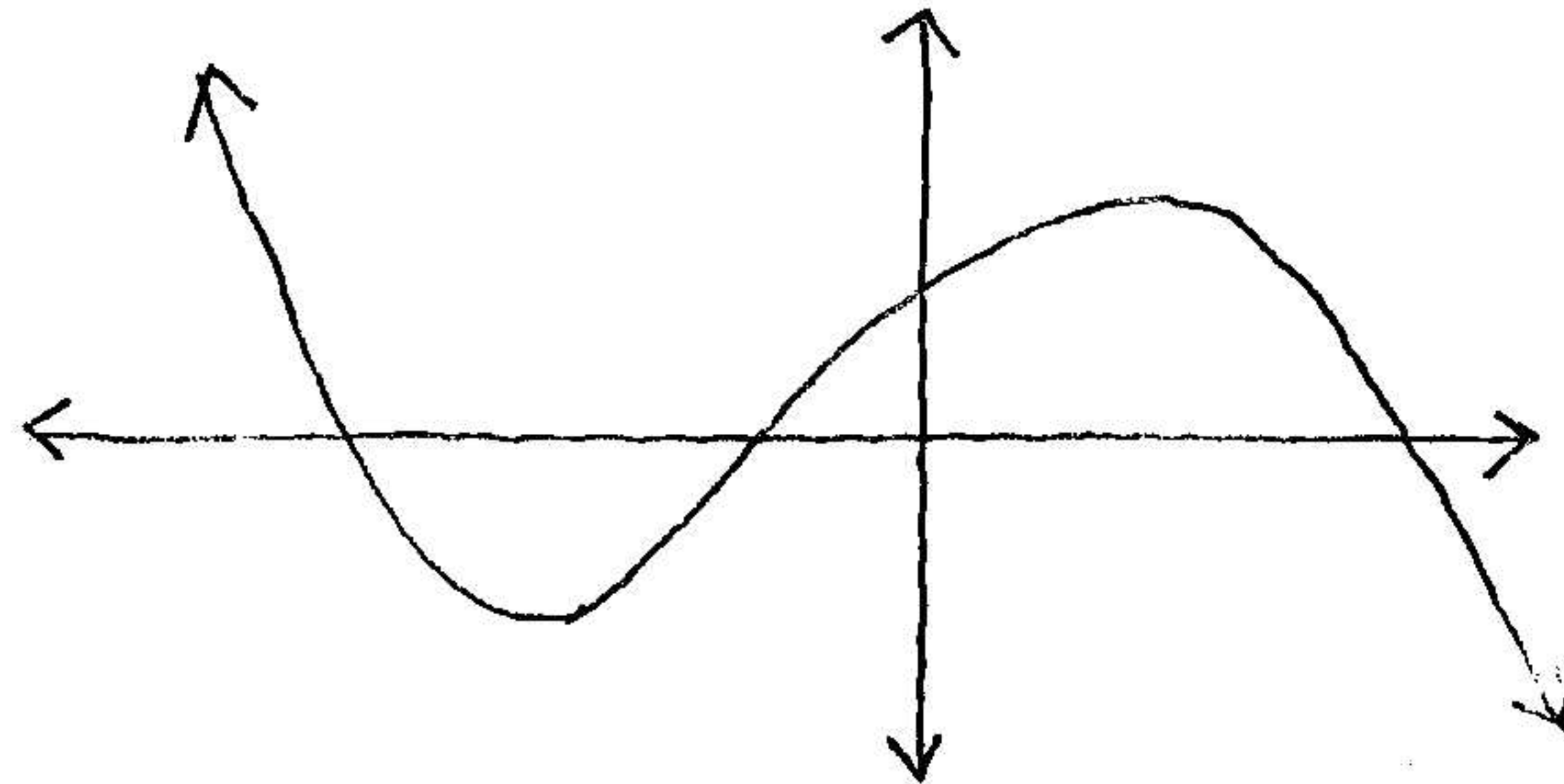
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Problem 3:



(a) Given $f(x)$ is the third degree polynomial whose graph is shown above, determine whether each of the following are negative, zero, or positive and give a brief explanation as to why.

• $f'(0)$ positive $\rightarrow f(x)$ is increasing

• $f''(0)$ negative $\rightarrow f(x)$ is concave down

• $f'''(0)$ negative \rightarrow from end behavior we can see the leading coefficient must be negative.

(b) Find $\frac{d}{dx} [-x^2 e^{-3x^2}]$

$$-2x e^{-3x^2} + (-x^2) e^{-3x^2} (-6x)$$

$$-2x e^{-3x^2} + 6x^3 e^{-3x^2}$$

Signature line: _____