

Directions

1. Do NOT open this exam booklet until you are instructed to do so!
2. You may use a TI-84/85 (or equivalent) calculator. Any other electronic devices or outside materials are not permitted.
3. This exam is 5 pages (including this cover page) and has 5 questions. Check that you have every page of the exam before handing it in.
4. Please write your answers in the space provided. If you need more space, continue on the back of a page (being sure to clearly label your work). Do not write any answers on scrap paper.
5. Work must be clearly written and organized. Please organize your work and write legibly! Circle your final answers.
6. If you have a question, please raise your hand.

Good luck!

Do not write in the tables or on the line below.

Question	Points	Score
1	30	
2	30	
3	20	
4	10	
5	10	
Total:	100	

1. (30 points) Find the derivative of each function. You do not need to simplify your answers.

(a) $f(x) = 10x^6 + 4x^4 - 3x^3 + 2x - 7$

(b) $f(x) = x^{-3} - x^{1/3}$

(c) $f(x) = (x^2 + 3x + 1)(4x^2 - 3)$

(d) $f(x) = \frac{x^2 - 2x - 4}{2x^3 + 3}$

(e) $f(x) = (x^3 + 2x - 1)^3$

2. (30 points) Find the derivative of each function. You do not need to simplify your answers.

(a) $f(x) = \ln(x^2 + \sin x)$

(b) $f(x) = \ln(10x + 1)e^{x^2+1}$

(c) $f(x) = \frac{\sin(x)}{\log_2(x)}$

(d) $f(x) = 5^{x^2+1}$

(e) $f(x) = \tan(\ln(x) + e^x)$

3. (20 points) A function f has first derivative $f'(x) = (x - 3)^2(x + 3)$ and second derivative $f''(x) = 3(x - 3)(x + 1)$.

(a) For which intervals is f increasing? For which is it decreasing?

(b) For what values of x does f have a maximum? For which does it have a minimum?

(c) Over which intervals is f concave up? For which is it concave down?

(d) For what values of x does f have an inflection point?

-
4. (10 points) Find the equation of a tangent line to the function $f(x) = \ln(x)$ when $x = 5$.
5. (10 points) Find the equation of a tangent line to the function $f(x) = \sin(x)$ when $x = \pi/2$.