

Name: _____

Student ID: _____

Section: _____

Instructor: _____

Math 112 (Calculus I) Final Exam Form A

Dec 14, 2010, 7:00-10:00 p.m.

Instructions:

- Work on scratch paper will not be graded.
- Show all your work in the space provided. Full credit will be given only if the necessary work is shown justifying your answer. Please write neatly.
- Should you have need for more space than is allotted to answer a question, use the back of the page the problem is on and indicate this fact.
- Simplify your answers. Expressions such as $\ln(1)$, e^0 , $\sin(\pi/2)$, etc. must be simplified for full credit.
- Calculators are not allowed.

For Instructor use only.

#	Possible	Earned
MC	50	
21a	4	
21b	4	
22	5	
23	5	
24	5	
Sub	73	

#	Possible	Earned
25	6	
26a	3	
26b	3	
27	5	
28	5	
29	5	
Sub	27	
Total	100	

21. (a) (4 points) Find $\lim_{x \rightarrow \infty} \sqrt{x^2 + 1} - x$.

(b) (4 points) Find $\lim_{x \rightarrow \infty} \frac{x \ln(x)}{x^2}$.

22. (5 points) Compute the definite integral $\int_1^2 \frac{x}{\sqrt{9 + x^2}} dx$.

23. (5 points) You own an emu ranch, and want to build a rectangular fence around your herd. One side of the fence must be built along the side of a river so the emu's have access to fresh water. You want to enclose at least 1000 square meters. The fencing material costs 6 dollars per meter, but the fencing along the river costs 10 dollars per meter (to allow the emu to drink the water). What are the dimensions which minimize the cost of your fence? What is the cost?

24. (5 points) Find the derivative of $f(x) = (2x)^{\ln(x)}$.

25. (6 points) Sketch the curve $f(x) = \frac{(x^2 - 1)}{x(x - 2)}$. Label all asymptotes, intercepts, local maxs and mins, and any inflection points.

26. (a) (3 points) Using the definition of derivative, write a limit (without evaluating the limit) that gives the derivative of $f(x) = 1/(x - 1)$.

(b) (3 points) Evaluate the limit you gave in part (a).

27. (5 points) The area of a circle is increasing at a rate of 3 m/s^2 . When the area is $\pi \text{ m}^2$, how fast is the circumference growing?

28. (5 points) The equation $e^{x+y} = y^2$ implicitly defines y as a function of x . Find dy/dx .

29. (5 points) Find the equation of the tangent line to the curve $y = e^x(x^2 + \ln(x+1) + 3)$ at the point $(0, 3)$.