Name:________________________

Student ID:________________________

Section:________________________

Instructor:________________________

Math 112 (Calculus I)
Final Exam Form A
April 16, 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	
21	5	
22	5	
23	5	
24	5	
25	5	
Sub	75	

#	Possible	Earned
26	5	
27	5	
28	5	
29	5	
30	5	
Sub	25	
Total	100	

Part II: Free Response. Show all work in the space provided. Use the back if you need more space, and indicate you have work there.. Work on scratch paper will not be reviewed.

21. (5 points) Find the derivative of $f(x) = x^2 \cos\sqrt{e^{2x}+1}$.

22. (5 points) A new species is introduced into an environment in which it has no natural predators begins growing heartily. After two months, the 24 individuals introduced at the start have increased to 30.

    (a) Assuming the growth is linear, find an expression for the number of individuals after t months.

    (b) With linear growth, how many individuals will there be after one year?

    (c) Assuming the growth is exponential, find an expression for the number of individuals after t months.

    (d) With exponential growth, how many individuals will there be after one year?

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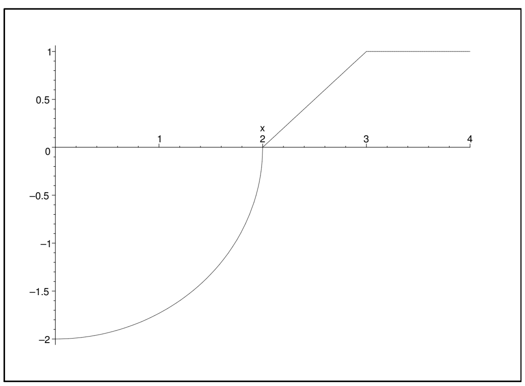
23. (5 points) Give an ϵ, δ proof of $\lim_{x\to 2} (5x-4) = 6$

24. (5 points) Evaluate the following definite integrals from the graph of $f(x)$. The curved portion of the graph is a circular arc.



(a) $\int_0^2 f(x)\,dx$

(b) $\int_2^4 f(x)\,dx$

(c) $\int_0^4 f(x)\,dx$

(d) $\int_3^2 f(x)\,dx$

(e) $\int_2^3 2f(x)\,dx - \int_3^4 f(x)\,dx$

25. (5 points) Find the equation for the tangent line to the curve given by $x^3y + 8y^3 = 0$ through the point $(-2, 1)$.

26. (5 points) An object moves along a coordinate line, its position at time t given by the function $x(t) = (4t - 1)(t - 1)^2, t \geq 0$.

    (a) When is the object moving to the right? When to the left? When does it change direction?

    (b) What is the maximum speed of the object when moving left?

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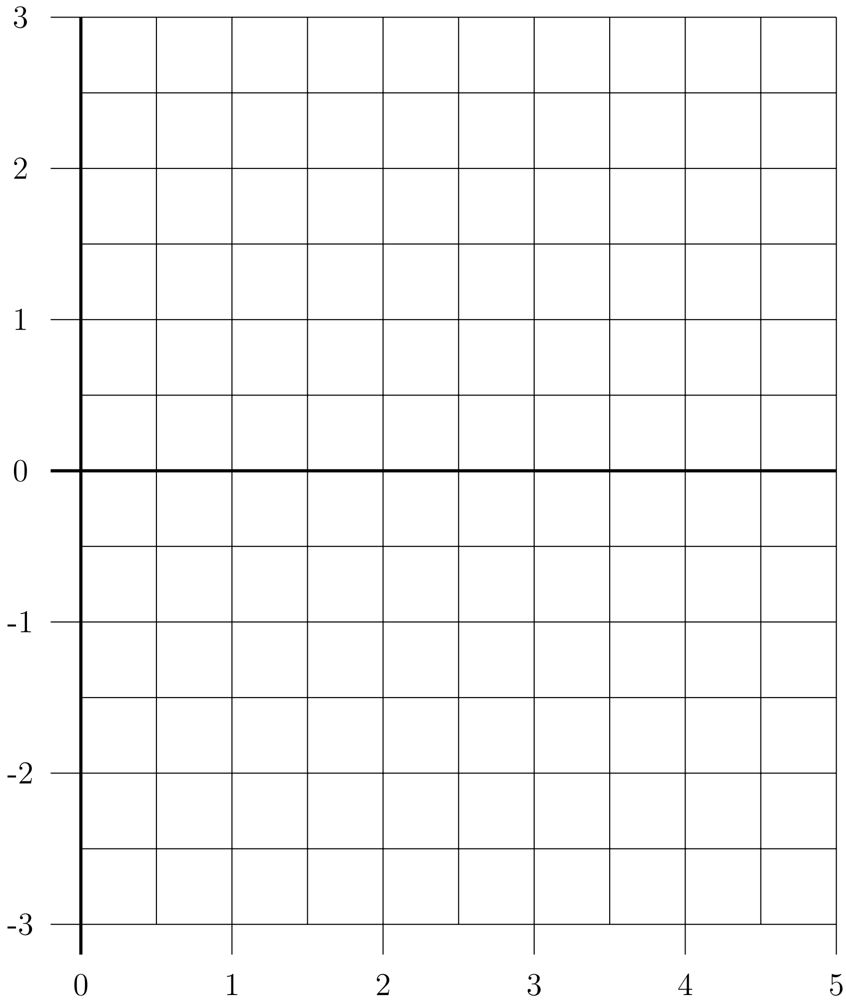
27. (5 points) Sketch the graph of $f(x) = \dfrac{x-2}{x^2-5x+6}$. Show all asymptotes.



28. (5 points) Each graph in the figure below is a position function for a particle moving along the x-axis during time $0 \le t \le 5$. The vertical scales are the same. Which particle has

(a) constant velocity?

(b) the greatest initial velocity?

(c) the greatest average velocity?

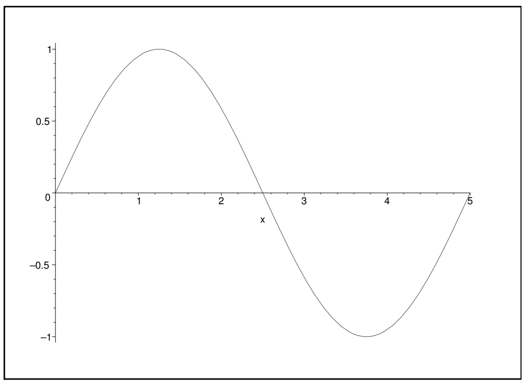
(d) zero average velocity?

(e) zero acceleration?

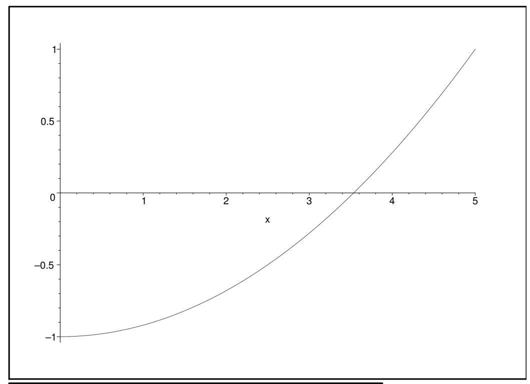
(f) positive acceleration throughout?

(g) negative acceleration throughout?

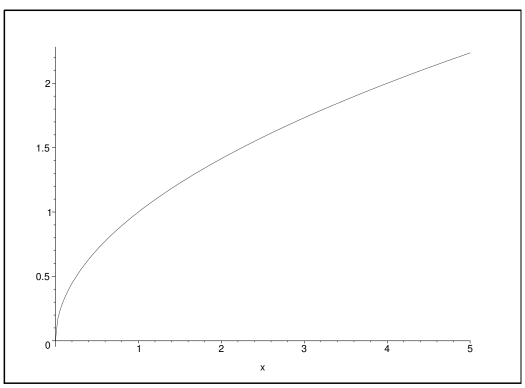
a)



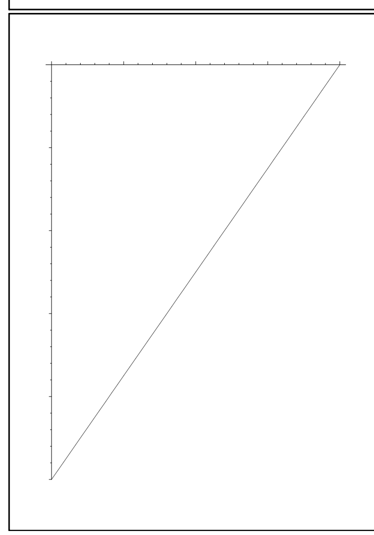
b)



c)



d)



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29. (5 points) Use logarithmic differentiation to evaluate the derivative of $y = \sqrt[3]{x}e^{x^2}(x^2+2)^8$.

30. (5 points) Use l'Hospital's Rule to evaluate $\lim_{x\to 1}\left(\frac{x}{x-1} - \frac{1}{\ln x}\right)$.

END OF EXAM