Name: _____

Instructor: _____

Math 10550, Exam III
November 15, 2011

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- No calculators.
- The exam lasts for 1 hour and 15 min.
- Be sure that your name is on every page in case pages become detached.
- Be sure that you have all 10 pages of the test.

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1.	(a)	(b)	(c)	(d)	(e)
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3.	(a)	(b)	(c)	(d)	(e)
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9.	(a)	(b)	(c)	(d)	(e)
10.	(a)	(b)	(c)	(d)	(e)

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Multiple Choice_____

11. _____

12. _____

13. _____

14. _____

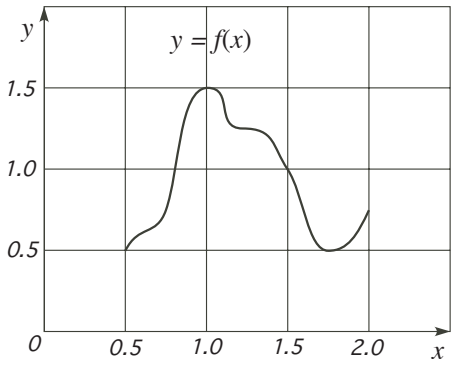
Total _____

Name: _____

Instructor: _____

Multiple Choice

1.(6 pts.) Estimate the area under the graph of $y = f(x)$ between $x = 0.5$ and $x = 2.0$, using a Riemann sum with **three** equal subintervals, using the **left-hand** endpoints.



(a) 3.0 (b) 2.0 (c) 1.5 (d) 1.0 (e) 4.0

2.(6 pts.) Find $\lim_{n\to\infty} \dfrac{n(n+1)(2n+1)}{6n^3}$.

(a) ∞ (b) 1 (c) 1/6 (d) 0 (e) 1/3

Name: _____

Instructor: _____

3.(6 pts.) Find the equation of the slant asymptote as $x \to \infty$ of the function

$$f(x) = \frac{2x^3}{x^2 - 1}.$$

(a) $y = 0$ (b) $y = 2x$ (c) $y = -x + 2$

(d) $y = -2x$ (e) $y = 2x + 1$

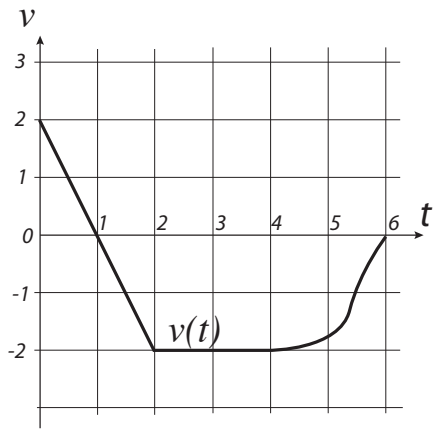
4.(6 pts.) In finding an approximate solution to the equation $x^4 - 2x^3 - 5 = 0$ using Newton's method with initial approximation $x_1 = 2$, what is x_2?

(a) 5/8 (b) 18/5 (c) 2/5 (d) 21/8 (e) 11/8

Name: _____

Instructor: _____

5.(6 pts.) The graph of the function $v(t)$ is given below:



Find $\int_0^4 v(t)\,dt$.

(a) -4 (b) 0 (c) 4 (d) -2 (e) 2

6.(6 pts.) Find an antiderivative $F(x)$ of $f(x) = 2x + 3\sqrt{x}$ satisfying $F(1) = 4$. Which of the following is $F(4)$?

(a) 16 (b) 9 (c) 27 (d) 33 (e) 7

Name: _____

Instructor: _____

7.(6 pts.) Evaluate the Riemann sum for $f(x) = 2 - x^2$ with $0 \leq x \leq 2$, using **four** subintervals and taking the sample points to be the **right-hand** endpoints of the intervals.

(a) 0.2 (b) 1.5 (c) 2.5 (d) 0.25 (e) 0.36

8.(6 pts.) By interpreting the integral as an area, evaluate $\int_{-2}^{2} (4 - x^2)^{1/2}\, dx$.

(a) $\frac{\sqrt{2}}{2}\pi$ (b) 2π (c) 4π (d) π (e) 0

Name: _____

Instructor: _____

9.(6 pts.) Evaluate $\displaystyle\int_1^2 \frac{x^2+\sqrt{x}}{x}\,dx$.

(a) $2-\dfrac{\sqrt{2}}{2}$ (b) $3\sqrt{2}$ (c) $2\sqrt{2}+\dfrac{1}{2}$

(d) $\sqrt{2}+2$ (e) $2\sqrt{2}-\dfrac{1}{2}$

10.(6 pts.) If $F(x)=\displaystyle\int_{x^2}^4 (t+1)\,dt$, find $F'(x)$.

(a) $-2x^3-2x$ (b) $2x^3+2x$ (c) x^2+1

(d) x (e) $\dfrac{x^2}{2}+x$

Name: _____

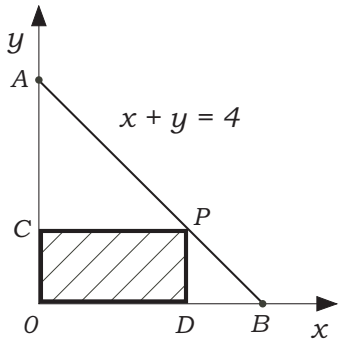
Instructor: _____

Partial Credit

You must show your work on the partial credit problems to receive credit!

11.(10 pts.) A rectangle $CODP$ (with sides CP and OD parallel to the x-axis) is inscribed in the region bounded by the lines $x + y = 4$ and the coordinate axes, with the corner P being on the line segment AB (including possibly at A or at B).

(a) Write the area $A(x)$ of the rectangle in terms of x, the x-coordinate of P.



(b) What is the range of possible values of x?

(c) Find the value of x that maximizes the area $A(x)$. For full credit, you must show that your answer **maximizes** $A(x)$.

Name: _____

Instructor: _____

12.(10 pts.) A ship is sailing along the path $y = 3x + 1$ (with units being nautical miles). A lighthouse is located at the point $(1, 1)$. How close does the ship come to the lighthouse? For full credit, be sure to show why the answer you have found is the **minimum** distance.

Hint: It might be easier to first minimize the **square** of the distance from the ship to the lighthouse.

Name: _____

Instructor: _____

13.(10 pts.) Let $f(x) = \dfrac{x\sqrt{x^2+1}}{x^2-1}$.

(a) Find the equations of all horizontal asymptotes of $y = f(x)$.

(b) Find the equations of all vertical asymptotes of $y = f(x)$.

Name: _____

Instructor: _____

14.(10 pts.) A particle is moving along a vertical axis, with the upward direction positive. Its velocity at time $t \geq 0$ (measured in seconds) is $v(t) = 8 - 6t$ (measured in meters per second). Its position at time t is $s(t)$, with $s(0) = 0$.

(a) Find $s(t)$. Find a time $t > 0$ for which $s(t) = 0$.

(b) At the time found in part (a), at what speed is the particle moving, and in what direction?

(c) Find the total distance that the particle travels between $t = 0$ and $t = 1$.

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