

Math C077 Instructor: _____ Your Name: _____

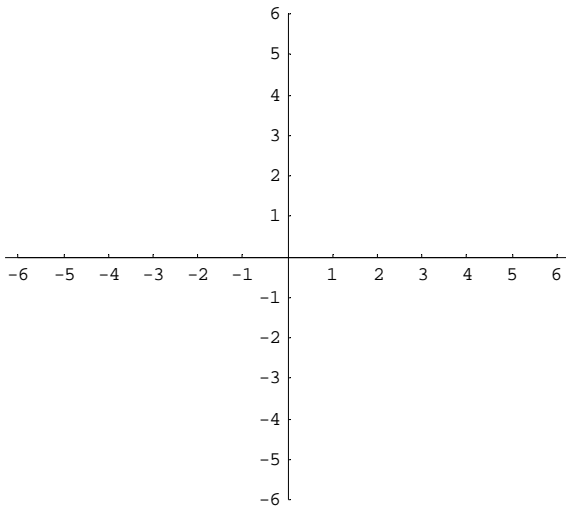
MATH C077 FINAL EXAM **FALL 2005** **December 13, 2005**

This exam consists of 10 questions.

SHOW ALL YOUR WORK! NO WORK, NO CREDIT.

Question	Points	Out of
1		6
2		8
3		10
4		10
5		15
6		17
7		10
8		6
9		8
10		20
Total		110

1. (6 points) Find the slope and y -intercept of the line $-2x + 4y = 2$ and graph this line.



2. (8 points) Let $f(x) = x^2 + 6x$. Find the equation of the line tangent to $f(x)$ when $x = -1$.

3. (10 points) In t seconds, a particle moves S meters in a straight line, where

$$S = 3t^2 - 2t.$$

(a) Find the average velocity between $t = 2$ and $t = 3$.

(b) Estimate the velocity of the particle $v(t)$ at $t = 2$ using $h = 0.01$.

(c) Find the **exact** velocity at $t = 2$.

4. (10 points)

Sketch the graph of a function on the interval $[-2,6]$ with the following properties.

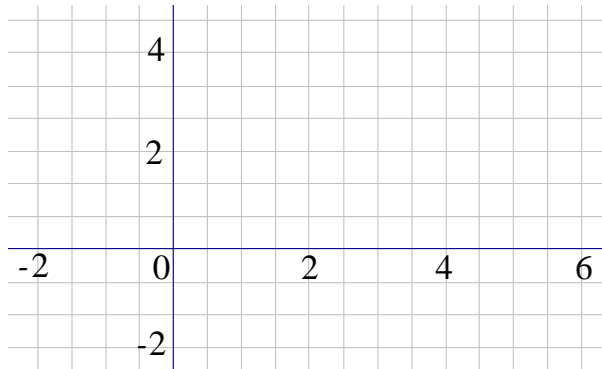
(a) $f''(x) > 0$, for $-2 < x < 0$ and for $2 < x < 4$

(b) $f''(x) < 0$, for $0 < x < 2$ and for $4 < x < 6$

(c) $f'(x) < 0$, for $x < -1$ and for $x > 5$

(d) $f'(x) > 0$, for $-1 < x < 5$

(e) $f(-1) = -2$ and $f(5) = 4$



In Problem 5, use the rules for differentiation to find the derivative of each of the given functions. Do not simplify.

5. (15 points)

(a) $f(x) = 5x^3 + \frac{1}{\sqrt[3]{x}}$

(b) $g(x) = e^{x^2-x-1}$

(c) $h(x) = x^2 \sin x$

(d) $i(x) = \frac{3x}{x+1}$

(e) $j(x) = \pi^x + x^\pi + \pi$

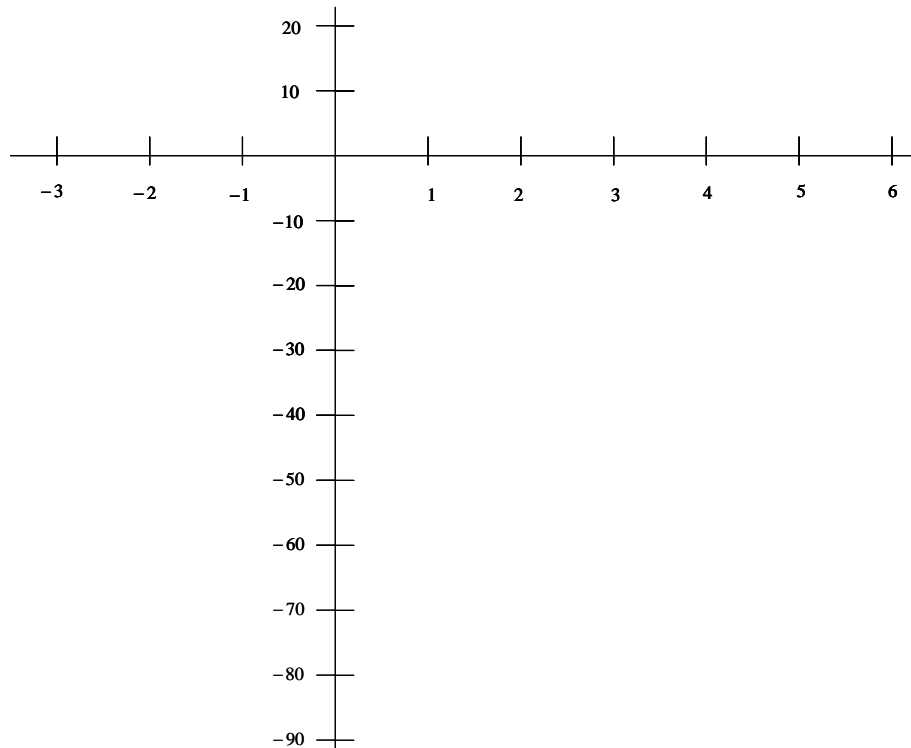
6. (17 points) Consider the function $f(x) = x^3 - 6x^2 - 18x + 10$.

(a)(4 points) Find the critical points for $f(x)$.

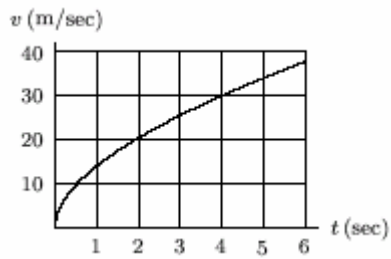
(b)(4 points) Find the local maxima and minima, if any, for $f(x)$.

(c)(4 points) Find the x and y coordinates of the global maximum and the global minimum of $f(x)$ on the interval $[-3, 5]$.

(d)(5 points) Use the above information to graph $y = f(x)$.



7. (10 points) The graph below shows the velocity $v(t) = 15\sqrt{t}$ of an object as a function of time t , in seconds

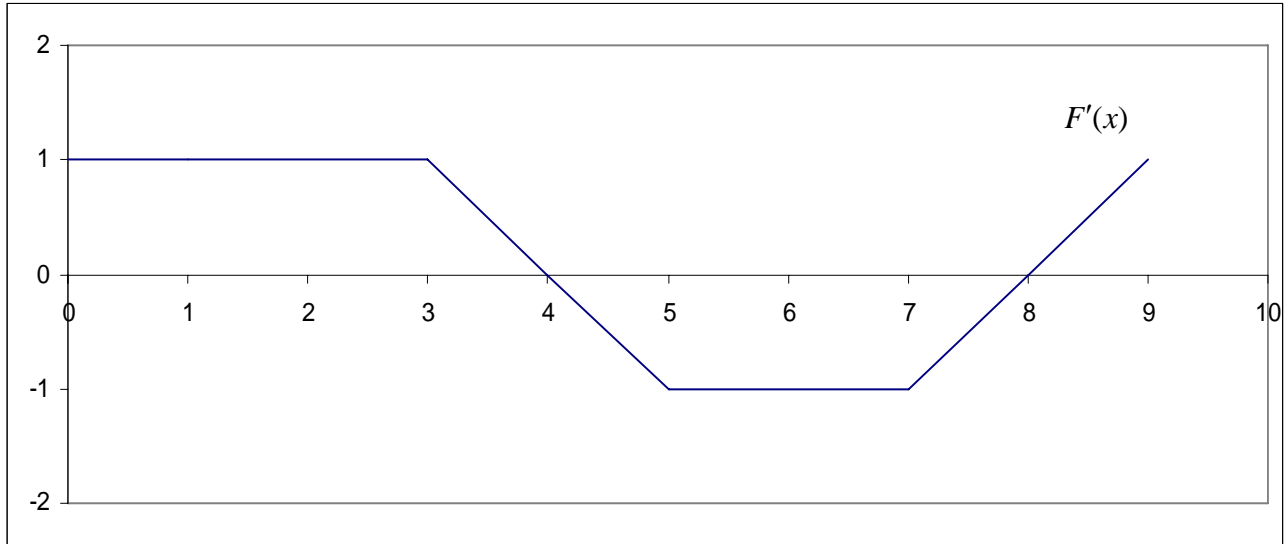


- (a) Use the graph to give a left-hand side estimate LHS and a right-hand side RHS for the total distance traveled in the interval $[0, 4]$.

- (b) Use the definite integral to find the exact distance traveled in the interval $[0, 4]$.

8. (6 points) The graph below shows the graph of $F'(x)$. We know that $F(0) = 3$, find $F(4)$, $F(6)$ and $F(8)$.

Hint: Use the Fundamental Theorem of Calculus, which states that *If $F'(x)$ is continuous on the interval $[a, b]$ then $\int_a^b F'(x)dx = F(b) - F(a)$.*



9. (8 points) (a) Find the area between the graph of $y = \frac{4}{x}$ and the interval $[2,4]$.

(b) Find the average value for $y = \frac{4}{x}$ between $x = 2$ and $x = 4$.

10. (20 points) Evaluate each of the following definite or indefinite integrals.

(a) $\int \left(x^2 + \frac{1}{x} \right) dx$

(b) $\int \frac{x}{x^2 + 1} dx$

(c) $\int x^2 \sin(x^3) dx$

(d) $\int_1^2 (x+5)^4 dx$