

Name: _____ PID: _____

TA: _____ Sec. No: _____ Sec. Time: _____

Math 10B.
Midterm Exam 1
January 25, 2011

Turn off and put away your cell phone.

You may use any type of calculator, but no other electronic devices during this exam.

You may use one page of notes, but no books or other assistance during this exam.

Read each question carefully, and answer each question completely.

Show all of your work; no credit will be given for unsupported answers.

Write your solutions clearly and legibly; no credit will be given for illegible solutions.

If any question is not clear, ask for clarification.

Solutions

#	Points	Score
1	6	
2	6	
3	6	
4	6	
Σ	24	

1. (6 points) Let f be a continuous and increasing function on the interval $[1, 6]$ such that $f(6) = 4$. Explain why

$$\int_1^6 f(x) dx \leq 20$$

f continuous and increasing implies

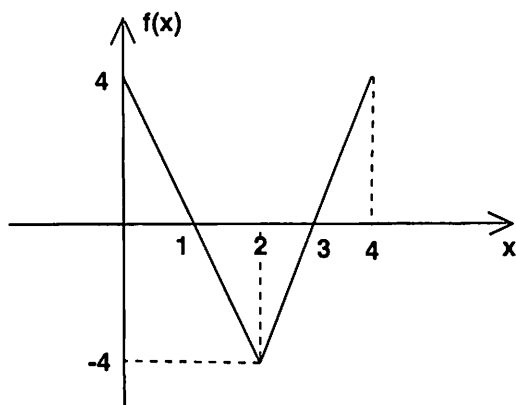
f is maximized on $[1, 6]$ at

$x = 6$. Thus $f(x) \leq 4$ on $1 \leq x \leq 6$.

By the Comparison Theorem

$$\int_1^6 f(x) dx \leq \int_1^6 4 dx = 20 \quad \square$$

2. (6 points) The graph of $f(x)$ is given below.



Let $F(x)$ be such that $F'(x) = f(x)$ and $F(0) = 0$.

(a) Find the *maximum* value of F and the point(s) at which it occurs.

$$F(1) = \frac{1}{2}(4)(1) = 2$$

$$F(4) = 2 - \frac{1}{2}(2)(4) + \frac{1}{2}(1)(4) = 0$$

F maximum at $x=1$, $F(1)=2$

(b) Find the *minimum* value of F and the point(s) at which it occurs.

$$F(3) = -2$$

(c) Find the point(s) of inflection of F .

Not clear if $x=2$ should
 "count" (f is not differentiable)

3. (6 points) Let $f(x)$ be an *odd* function with $\int_{-2}^3 [5f(x) + 2] dx = 20$.

Evaluate $\int_2^3 f(x) dx$.

$$\int_{-2}^3 5f(x) + 2 = 20$$

$$5 \int_{-2}^3 f(x) dx + \int_{-2}^3 2 dx = 20$$

$$5 \int_{-2}^3 f(x) dx = 10$$

$$\int_{-2}^3 f(x) dx = 2$$

4. (6 points) A car going 80 ft/sec (about 55 mph) brakes to a stop in 8 seconds. Its velocity is recorded every 2 seconds and is given in the following table.

t (seconds)	0	2	4	6	8
$v(t)$ (ft/sec)	80	54	36	16	0

- (a) Find the left-hand sum estimate of the distance traveled by the car during the 8 seconds.

Skip

- (b) Find the right-hand sum estimate of the distance traveled by the car during the 8 seconds.

Skip

- (c) Which of the following best explains why the left-hand sum gives an overestimate of the actual distance the car travels? Circle your choice.

- A. The velocity $v(t)$ is a *decreasing* function.
B. The velocity $v(t)$ is an *increasing* function.
C. The velocity $v(t)$ is a *concave up* function.
D. The velocity $v(t)$ is a *concave down* function.
E. Both A and C
F. Both B and D
G. None of the above