

MY NAME IS:

IN RECITATION SECTION:

MY ID NUMBER IS:

Problem	1	2	3	4	5	Total
Score						

**MAT 126**  
**Calculus B**  
**Midterm 1**  
February 27, 2008

NO BOOKS OR NOTES MAY BE CONSULTED DURING THIS TEST.

NO CALCULATORS MAY BE USED.

Show all your work on these pages!

*The last part of each problem should be more challenging than the rest.*

Each problem is worth 20 points. Total score = 100

R01	41224	F	12:50pm- 1:45pm	Physics P117	Arthur Popa
R02	41225	Tu	11:20am-12:15pm	S B Union 231	Luca Di Cerbo
R03	41226	Tu	11:20am-12:15pm	Library N3085	Benjamin Balsam
R04	41227	Th	9:50am-10:45am	Library N3074	Ying Chi
R05	49852	M	12:50pm- 1:45pm	Physics P123	Claudio Meneses
R31	50898	M	2:20pm- 3:15pm	SBS N110	Eitan Chatav
R33	50900	Tu	12:50pm- 1:45pm	SBS N110	Matthew Young
R06	41228	M	9:35am-10:30am	Lgt Eng 154	Carl Hammarsten
R07	41229	W	2:20pm- 3:15pm	Physics P117	Ning Hao
R08	41230	Tu	3:50pm- 4:45pm	Lgt Eng 154	Benjamin Balsam
R09	41231	Th	9:50am-10:45am	Library N3063	Eitan Chatav
R10	49853	Tu	11:20am-12:15pm	E. & Space 183	Weixin Guo
R11	50394	F	12:50pm- 1:25pm	Physics P123	Claudio Meneses
R12	50395	W	11:45am-12:40pm	Physics P123	Peter Agcaian
R13	50396	Th	2:20pm- 3:15pm	Library N3085	Weixin Guo
R14	50427	M	11:45am-12:40pm	Library N3085	Nathaniel Rounds
R15	50433	W	8:30am- 9:25am	Library N3063	Carl Hammarsten
R16	50902	Tu	9:50am-10:45am	Library N3033	Alin Costin
ELC 90	50664	MW	6:50pm- 8:10pm	Physics P130	Daniel An

Figure 1: Find your section here.

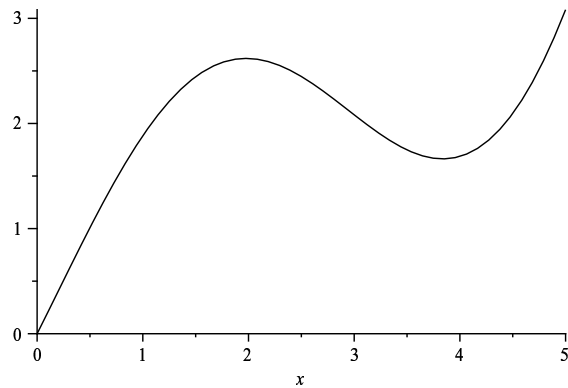


Figure 2: The graph of  $f(x)$ .

1. (a) (15 points) The figure shows the graph of a function  $f(x)$  defined for  $0 \leq x \leq 5$ . Estimate the area under this graph as the sum of five rectangles based on  $[0, 1]$ ,  $[1, 2]$ ,  $[2, 3]$ ,  $[3, 4]$ ,  $[4, 5]$ , where the height of each rectangle is the value of  $f$  at the left-hand endpoint of its base.

- (b) (5 points) Sketch in on the graph the areas representing the *difference*:

[estimate from part (a)] *minus* [area under graph].

Label them “+” or “-” according as they are places where the estimate is too large, or places where the estimate is too small. Make sure your work is clear enough for the graders to understand what you mean.

2. (20 points) An Air Chance passenger plane touches down with ground speed 200 feet per second (136.4 mph). The pilot immediately puts the engines into reverse thrust to slow the plane down. The speed at  $t$  seconds after touchdown is recorded in the following table.

time in seconds	0	1	2	3	4	5	6	7
speed in feet/sec	200	180	150	120	90	70	50	30

After 7 seconds the plane is traveling at 30 feet/sec and can proceed at that speed to the terminal.

How far did the plane travel while it was decelerating to taxiing speed? Use the speeds in the table to get an *upper bound* and a *lower bound* for this distance.

3. (a) (15 points) Estimate  $\int_0^2 (1 - x^2) dx$  by a Riemann sum with four equal subintervals. Use the left-hand endpoints as your  $x_i^*$ .

- (b) (5 points) Is this sum an overestimate or an underestimate? Explain carefully.

4. Calculate (show all work; NO CREDIT for unjustified answers):

(a) (8 points)  $\int \sqrt[3]{x^2} dx$

(b) (8 points)  $\int_{\pi}^{2\pi} \sin x dx$

(c) (4 points)  $\int_0^t \frac{1}{(x^2 + 1)} dx$

5. (a) (15 points) Calculate the area under the graph of  $f(x) = x^2 + 3x$  and above the  $x$ -axis, between  $x = 1$  and  $x = 2$ .

- (a) (5 points) Sketch the total area enclosed by the graph of  $f(x) = x^2 - x - 6$ , the  $x$ -axis, and the vertical lines  $x = 1$  and  $x = 4$ ; and calculate it exactly. Note that  $x^2 - x - 6 = (x + 2)(x - 3)$ , so the function changes sign at 3.

END OF EXAMINATION