



Test #1

Instructor: _____

Name: (print neatly) _____
(sign) _____

This exam is CLOSED NOTES and CLOSED BOOK. There are NO CALCULATORS allowed. To get full credit you must show all work neatly in the space provided on the test paper.

1. [10 pts each] Compute the following integrals:

a. $\int 5x^2 - 3 + \sqrt{x} + \frac{1}{2\sqrt{x}} dx$

b. $\int x^2 \sin(3 - x^3) dx$

c. $\int \sin(t)(\cos^2(t) + 1) dt$

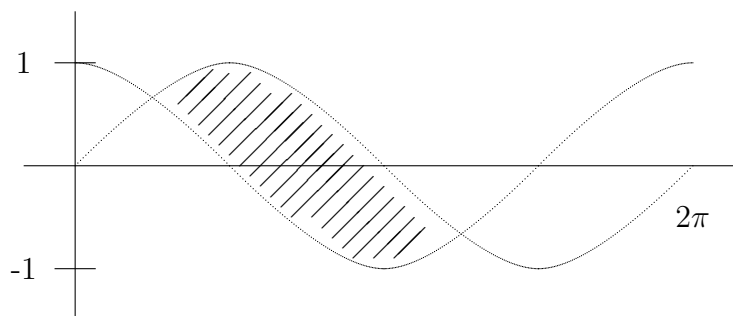
d. $\int_0^2 \sqrt{x} - \sqrt{2} \, dx$

e. $\int_1^2 \frac{t - t^{-1}}{t^4} \, dt$

f. $\int \sec^2(\theta + \pi) \, d\theta$

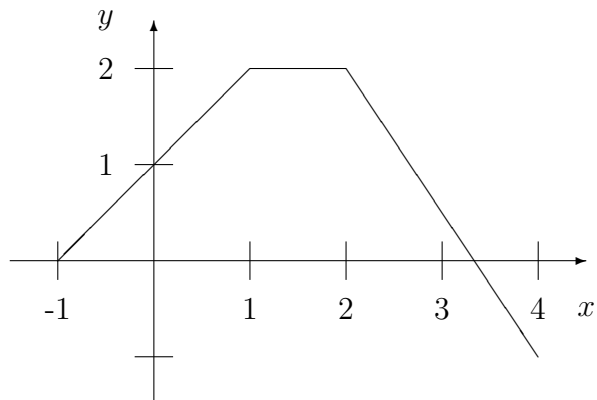
2. [8 pts] Use the substitution $u = x^2$ to transform the integral $\int_1^2 x^5 \sin(x^2) dx$ into an integral with respect to u . [Do not evaluate the integral.]

3. [8 pts] Find the area of the finite region bounded by the graphs of $\sin(x)$ and $\cos(x)$ indicated below.



4. [8 pts] The function $f(x)$ is drawn below. Let P be the partition

$$P = \left\{ -1, -\frac{1}{2}, 0, 1, 2, \frac{5}{2}, \frac{7}{2}, 4 \right\}.$$



a. On the graph of $f(x)$ above, draw the rectangles corresponding to $L_f(P)$.

b. Suppose $Q = \{-1, 0, 1, 2, 4\}$, What is $U_f(Q)$?

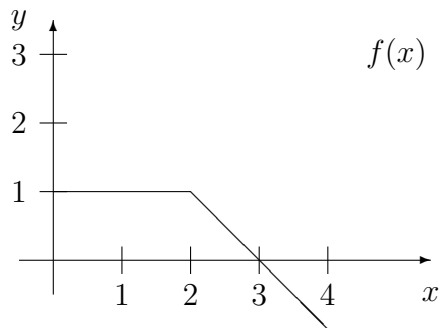
c. Order the following numbers from smallest to largest: $U_f(Q)$, $L_f(Q)$, $U_f(P)$, $L_f(P)$, and $\int_{-1}^4 f(x) dx$.

5. [8 pts] Suppose $f(x)$ is a continuous function defined on $[1, 3]$ with $-1 < f(x) < 2$.

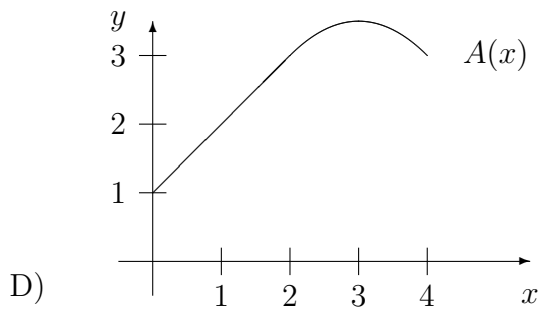
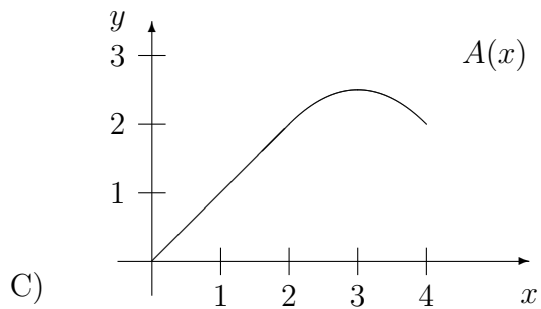
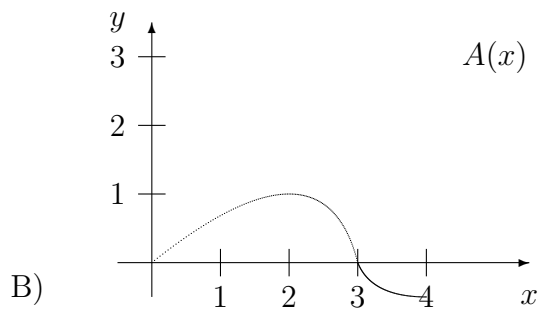
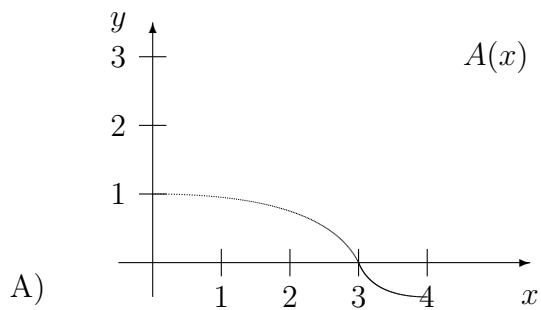
a. Show that it must be true that $\int_1^2 3 + f(x) + 2[f(x)]^2 dx < 30$.

b. Give an example of to show that it may be true that $\int_1^2 3 + f(x) + 2[f(x)]^2 dx > 10$.

6. [8 pts] The function $f(x)$ is pictured below. Let $A(x) = \int_0^x f(t) dt$ be the accumulation function.



a. Circle the letter of the correct graph of $A(x)$ below.



b. Compute $A'(x)$.