



Test #1

Name: (print neatly) \_\_\_\_\_

Instructor:  Joyce       Servatius

(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 definite integrals:

a.  $\int_0^1 (9t^3 - 4t^2) dt$

b.  $\int_{-\pi/2}^{\pi/2} (\cos x - \sin x) dx$

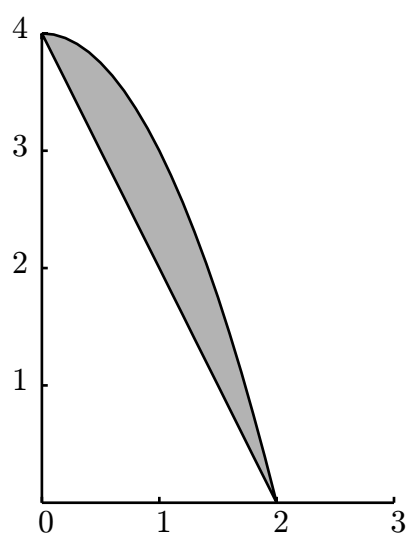
2. [10 pts each] Compute the following indefinite integrals:

a.  $\int \left( \frac{t^2 - t^{-2}}{t^4} \right) dt$

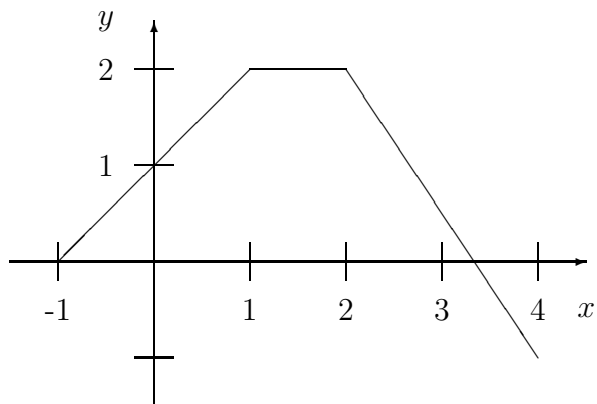
b.  $\int \left( \frac{\sqrt{x}}{\sqrt{2}} + \frac{\sqrt{2}}{\sqrt{x}} \right) dx$

c.  $\int (x^2 + 4)(x + 1) dx$

3. [10 pts] Find the area of the finite region bounded between  $y = 4 - x^2$  and  $y = 4 - 2x$  for  $0 \leq x \leq 2$ , indicated below.



4. [16 pts] A  $f(x)$  is drawn below. It's graph consists of three line segments. Let  $P$  be the partition  $P = \{-1, 0, 3, 4\}$ .



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

b. Compute  $L_f(P)$ , and  $U_f(P)$ .

c. Compute  $\int_{-1}^4 f(x) dx$

5. [12 pts] Suppose  $f(x)$  and  $g(x)$  are continuous functions defined on  $[0, 5]$  with  $\int_0^3 f(x) dx = 5$ ,  $\int_0^5 f(x) dx = 2$  and  $\int_3^5 (3g(x) + 1) dx = 20$ .

a) What is  $\int_5^0 f(x) dx$ ?

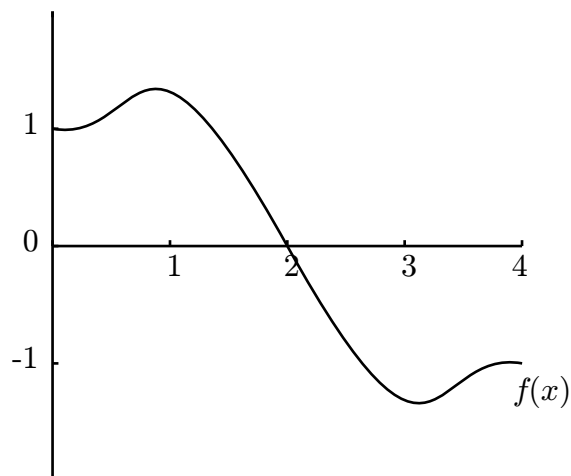
b) What is  $\int_0^5 (2f(x) - 1) dx$ ?

c) What is  $\int_3^5 g(x) dx$ ?

d) What is  $\int_3^5 (f(x) + g(x)) dx$ ?

6. [12 pts] The function  $f(x)$  is pictured below. Let  $F(x) = \int_0^x f(t) dt$  be signed area under the curve from 0 to  $x$ , so

$$F(x) = \int_0^x f(t) dt.$$



For each of the following statements, say whether it is true or false, and give a brief reason why.

a)  $F(2) > 1$ .

b)  $F(4) > 1$ .

c)  $F(0) = 1$ .

d)  $F'(3) = 0$ .

Prob	Pts
1	
2	
3	
4	
5	
6	
Total	