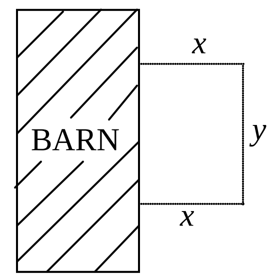
Assignment 5 MATH 1500

(Follows Unit 13 in the manual)

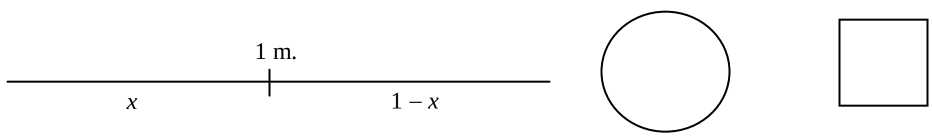
Values

[8] 1. Find a positive number such that the sum of the number and its reciprocal is as small as possible. [cf. Section 4.7]

[10] 2. A farmer has 20 *m* of fencing material. He wishes to enclose a rectangular plot of land adjacent to his barn. No fence is needed on the side adjacent to the barn. Find the dimensions of the rectangle of largest area that can be enclosed with the 20 *m* of fencing material.
[cf. Section 4.7]



[12] 3. A 1 m. long piece of wire is cut into 2 pieces. One piece is bent into the shape of a circle while the other piece is bent into the shape of a square. [See diagram.]



(a) Let A_1 represent the area of the circle and let x represent the length of the piece of wire used to make the circle. Find an equation giving the area A_1 of the circle as a function of the length x. What is the domain of this function?

(b) Let A_2 represent the area of the square. Find an equation giving the area A_2 of the square as a function of x. What is the domain of the function A_2?

(c) Let A represent the sum of the area of the circle and the area of the square. Write A as a function of x. What is the domain of A?

(d) Find the value of x that gives a minimum value for A. For what value of x will A have a maximum value? [cf. Section 4.7]

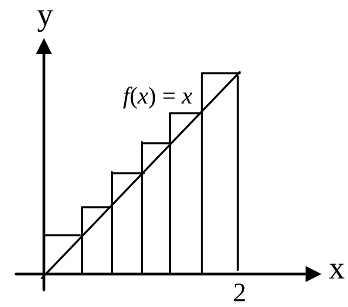
[6] 4. Find the most general antiderivative $F(x)$ of the given function $f(x)$.
[cf. Section 4.10]

(a) $f(x) = 2x^3 + 4x^2 - 6$ (b) $f(x) = \dfrac{2}{x} - \sin x$

[8] 5. Find the antiderivative $F(x)$ of the function $f(x)$ that satisfies the given conditions. [cf. Section 4.10]

(a) $f(x) = 3x^2 + 3x + 4$ $F(2) = 5$ (b) $f(x) = e^{2x} + \sin x$ $F(0) = 3$

[10] 6. Find the area of the region that lies under the graph of $f(x) = x$ between $x = 0$ and $x = 2$ by taking the limit of the sum of approximating rectangles whose heights are the values of the function at the right hand end point of each subinterval. [cf. Section 5.1]



[8] 7. Evaluate each of the following definite integrals by interpreting it as an area. [cf. Section 5.2]

(a) $\int_0^4 (x+1)dx$ (b) $\int_{-2}^2 \sqrt{4-x^2}\,dx$

[8] 8. Use the Fundamental Theorem of Calculus to evaluate the following definite integrals. [cf. Section 5.3]

(a) $\int_{-1}^3 \left(2x + x^2\right)dx$ (b) $\int_1^3 \left(\frac{x^3+1}{x}\right)dx$

Total = 70