



Math 280 Section C1 Quiz 5
 March 5, 2001

Problem 1.

Set up the following integral as an iterated integral:

$$\int_R f(x, y) \, dx \, dy$$

where R is the region of the xy -plane bounded by the curves $y = x^2 - 1$ and $y = 3x - 3$.

Solution.

First we find the intersection points of the curves $y = x^2 - 1$ and $y = 3x - 3$:

$$x^2 - 1 = 3x - 3 \Rightarrow x^2 - 3x + 2 = 0, \Rightarrow (x - 1)(x - 2) = 0, \Rightarrow x = 1, x = 2.$$

The corresponding values of y are $y = 1^2 - 1 = 0$ and $y = 2^2 - 1 = 3$. Thus the intersection points are $(1, 0)$ and $(2, 3)$. We can see from the graph that if $1 \leq x \leq 2$ then $x^2 - 1 \leq 3x - 3$. Therefore the integral can be written as:

$$\int_R f(x, y) \, dx \, dy = \int_1^2 \left(\int_{x^2-1}^{3x-3} f(x, y) \, dy \right) dx$$