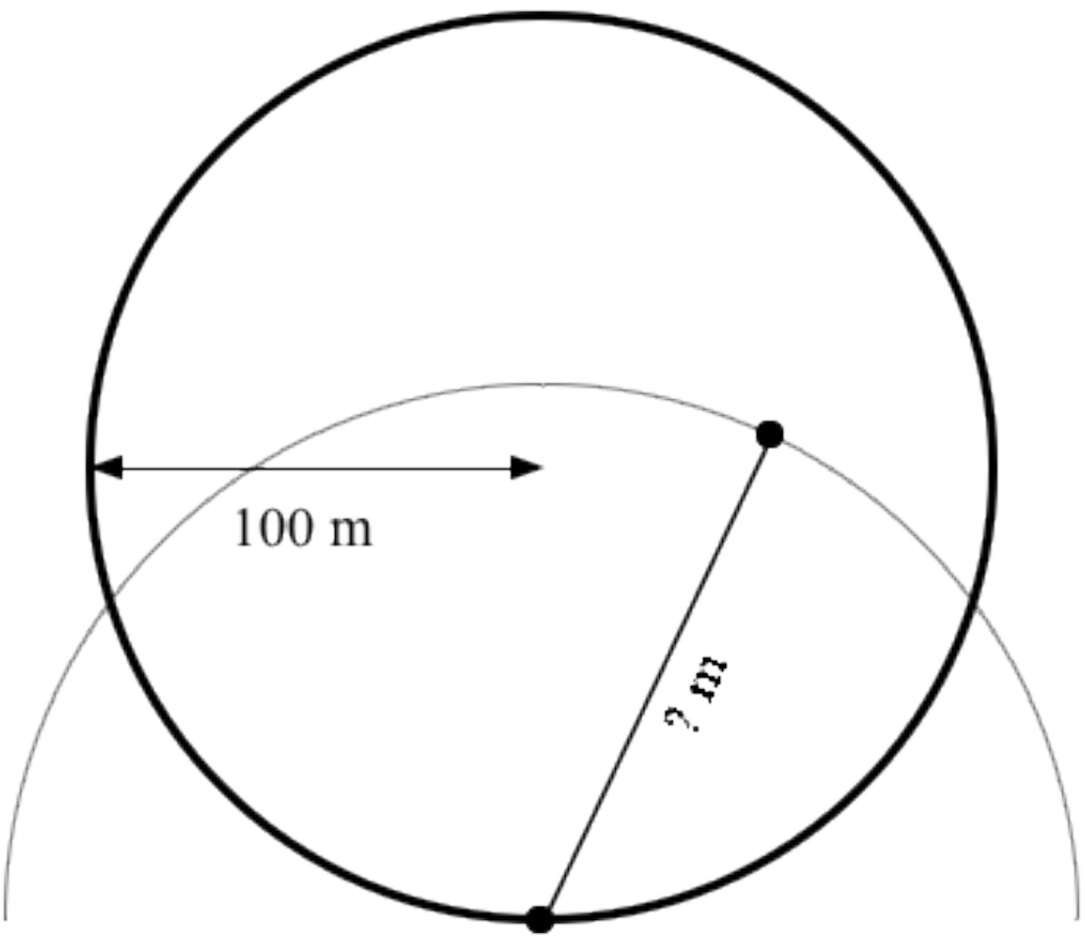
Mathematics 1101Y – Calculus I: functions and calculus of one variable
Trent University, 2010–2011

Assignment #10
The geometric goat
Due on Friday, 11 March, 2011.

We will attempt to solve the following problem:

> A goat is tethered by a rope to a point on the edge of a circular field with diameter 100 meters. What length should the rope be so that the goat can graze in exactly half the field?



1. Use polar coordinates to set up and compute an integral – which will involve the unknown length t of the goat's tether – for the area of the part of the field accessible to the goat. *[7]*

2. Set the expression you obtained in **1** for the area of the part of the field accessible to the goat equal to half the area of the field and solve for the length t of the goat's tether. *[3]*