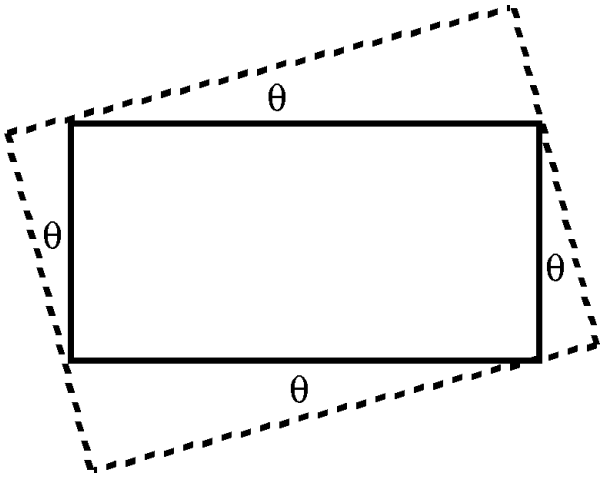
Mathematics 110 – Calculus of one variable
Trent University 2002-2003

ASSIGNMENT #4
Due: 8 November, 2002

Rectangles

1. Suppose we are given a rectangle of height 1 and width 2. What is the maximum area of a rectangle circumscribed about the given one, as in the diagram below? *[10]*



Note: Rectangle A is *circumscribed* about rectangle B (and B is *inscribed* in A) if B is inside A and the corners of B touch the borders of S.

Hint: Express the lengths of the sides of the circumscribed rectangle in terms of the angle θ between its sides and the sides of the given rectangle.

Bonus. Suppose you draw a number of circles on a blank piece of paper. This divides up the paper into a number of regions whose borders are made up of circular arcs. Prove that you can colour these regions with only *two* colours in such a way that no two regions that have a common border have the same colour, as in the example below. *[1]*