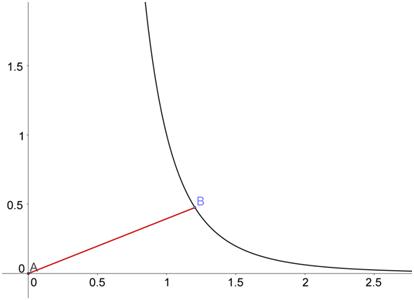
**A minimum problem**

Find the shortest distance from the origin O to the curve (where x > 0).

Use the following methods:

**(1) Calculus,**

**(2) A.M.≥ G.M.**





**(1) Calculus:**

**Method 1**

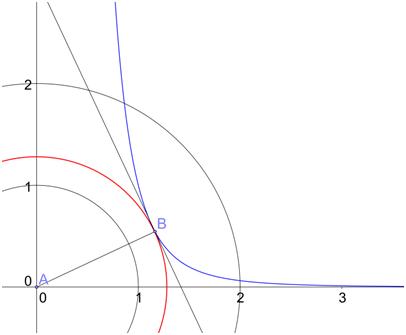
For critical points, .

For . and for .

Therefore y is a minimum when .

When

**Method 2**

**** Construct a circle centre origin and radius r : …. (1)

Common tangent

Too big circle, two intersection points

Too small circle, no intersection point

In order to find the shortest r, we like to have this circle **touches** the given curve:

…. (2)

Then (1) and (2) should have a common tangent

at the point of contact .

Differentiate (1) and (2),

…. (3)

By (2),

By (3),

By (1),

**(2) A.M.≥ G.M. :**

(A.M. ≥ G.M.)

The point is to get rid of all x !

where equality holds if and only if

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**12 June, 2015**