Optimization Practice Problem

The tensile stress induced in a particular rectangular beam is given by the following equation:

$$s = \frac{3}{4}\frac{M}{xy^2}.$$

While the engineer must find x and y that will minimize the stress in this particular beam, she must also ensure that the equation $x^2 + y^2 = a^2$ always remains true (a is a constant).

What is the objective function:

What are the design variables:

What are the elements of the gradient:

Find the analytical solutions for x and y that will make the bending stress a minimum.

Verify that you found a minimum.