MATH 3B ARCLENGTH AND SURFACE AREA OF REVOLUTION

I. Arclength

In terms of x : the length of the curve $y = f(x)$ on the interval $a \leq x \leq b$ is

In terms of y : the length of the curve $x = g(y)$ on the interval $c \leq y \leq d$ is

Example (cf. Problem 12). Find the length of the curve $x = \frac{y^4}{8} + \frac{1}{4y^2}$ for $1 \leq y \leq 2$.

II. Surface Area of Revolution

The general formula:

If rotated about the y-axis:

If rotated about the x-axis:

Example (Problem 20). Find the surface area of the solid obtained by rotating the region

$$R = \{(x, y) | x \geq 1, 0 \leq y \leq 1/x\}$$

about the x-axis.

Volume. Now find the volume of the solid obtained by rotating R about the x-axis.