Student No: _____

Name: _____

Surname: _____

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MATH 118 - 2018 Spring
Section-24   Quiz-2

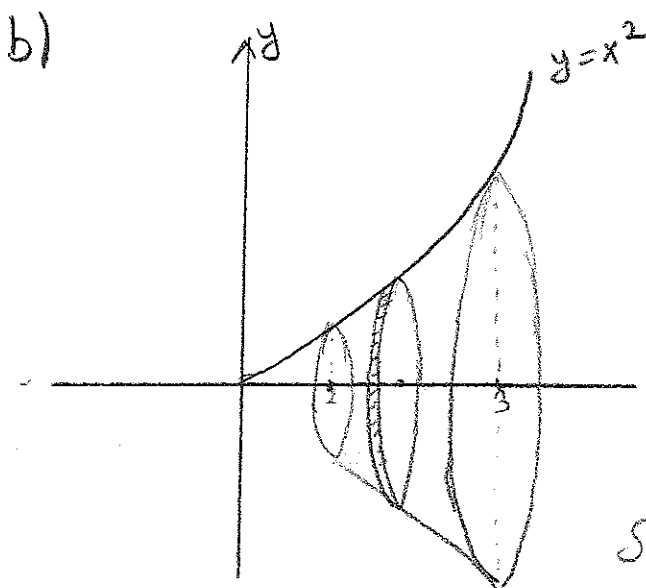Let C be the curve $y = x^2$ from $x = 2$ to $x = 3$.

(a) Set up an integral for the length of C. (Do not evaluate the integral.)

(b) Set up an integral for the area of the surface obtained by rotating C about the x-axis. (Do not evaluate the integral.)

Note: Show all your work as is done in the lectures.

ANSWER

a) $ds = \sqrt{1 + \left(\dfrac{dy}{dx}\right)^2}\, dx = \sqrt{1 + (2x)^2}\, dx = \sqrt{1 + 4x^2}\, dx$

$$\text{length of } C = \int_{x=2}^{x=3} ds = \int_{2}^{3} \sqrt{1 + 4x^2}\, dx \quad \text{units}$$

b)

$r = x^2$

$ds = \sqrt{1 + \left(\dfrac{dy}{dx}\right)^2}\, dx = \sqrt{1 + 4x^2}\, dx$

$dS = 2\pi r\, ds = 2\pi x^2 \sqrt{1 + 4x^2}\, dx$

$$\text{Surface Area} = \int_{2}^{3} dS = \int_{2}^{3} 2\pi x^2 \sqrt{1 + 4x^2}\, dx \quad \text{Square units.}$$