MATH 102
QUIZ # 4

NAME: .... SEC. #: . . . . . .

ID #: ....

Q1. Prove the identity:

$$\cosh^2 x + \sinh^2 x = \cosh 2x$$

$$\underline{\text{L.H.S.}} = \left(\frac{e^x + e^{-x}}{2}\right)^2 + \left(\frac{e^x - e^{-x}}{2}\right)^2$$

$$= \frac{1}{4}[(e^{2x} + 2e^0 + e^{-2x}) + (e^{2x} - 2e^0 + e^{-2x})]$$

$$= \frac{1}{4}(2e^{2x} + 2e^{-2x}) = \frac{e^{2x} + e^{-2x}}{2} = \cosh 2x = \underline{\text{R.H.S.}}$$

Q2. Find the area of the surface that is generated by revolving the portion of the curve $y = x^2$ between $x = 1$ and $x = 2$ about the y-axis.

See example 2 page 494

Q3. Find the arc length of the curve $y = \cosh x$ between $x = 0$ and $x = \ln 2$

$$\frac{dy}{dx} = \sinh x$$

$$L = \int_0^{\ln 2} \sqrt{1 + (\frac{dy}{dx})^2}\, dx$$

$$= \int_0^{\ln 2} \sqrt{1 + \sinh^2 x}\, dx$$

$$= \int_0^{\ln 2} \cosh x\, dx = \sinh x\, |_0^{\ln 2}$$

$$= \frac{e^{\ln 2} - e^{-\ln 2}}{2} = \frac{3}{4}$$