Instruction: Fill in all blanks and examples. The last page is optional.

Arc Length

Arc Length

Copy Theorem 5, pg 653

If a curve Γ is described by the parametric equations $\begin{cases} x = h(t) \\ y = k(t) \end{cases}$, $\alpha \le t \le \beta$, where $h'(t)$ and $k'(t)$ are continuous on $[\alpha, \beta]$ and Γ is traversed exactly once as t increases from α to β, then the length of Γ is

$$L = \underline{\hspace{6cm}}.$$

Note: Γ is pronounced ‘Gamma’.

Example:
Solve the question given in Example 4, pg 653.

Example:

Consider the parametric curve (**cycloid**) $\Gamma : \begin{cases} x = 2\,(\theta - \sin\theta) \\ y = 2\,(1 - \cos\theta) \end{cases}$ where $0 \le \theta \le 2\pi$. Find the length of Γ.

This is a special case of Example 5, pg 653-654.

Surface Area

Surface Area

Copy Equation 6, pg 654.

If the curve Γ given by the parametric equations $\begin{cases} x = h(t) \\ y = k(t) \end{cases}$, $\alpha \leq t \leq \beta$, is rotated about the $x-$axis, where $h'(t)$ and $k'(t)$ are continuous and $k(t) \geq 0$, then the area of the resulting surface is given by

$$S_A = \underline{\hspace{8cm}} .$$

Example:
Solve the question given in Example 6, pg 654.

Example(Optional):

Consider the parametric curve (**cycloid**) $\Gamma : \begin{cases} x = 2(\theta - \sin\theta) \\ y = 2(1 - \cos\theta) \end{cases}$ where $0 \leq \theta \leq 2\pi$. Find the surface area formed by rotating Γ about the $x-$axis.