Print Name: Key

Sign Name: _____

TARDIS CODE:				

Mathematics 5B Spring 2011: Lecture Quiz 2
April 15, 2011
Professor J. Douglas Moore

Multiple Choice. Circle the best answer to each of the following questions. Each question is worth 2 points.

1. A parametrization of the line segment in $\mathbb{R}^3$ from $(1,3,2)$ to $(4,4,5)$ is the map $\mathbf{x} : [0,1] \to \mathbb{R}^3$ such that

a. $\mathbf{x}(t) = (1+t)\begin{pmatrix}1\\3\\2\end{pmatrix} + t\begin{pmatrix}3\\1\\3\end{pmatrix}$

b. $\mathbf{x}(t) = (1+t)\begin{pmatrix}1\\3\\2\end{pmatrix} + t\begin{pmatrix}4\\4\\5\end{pmatrix}$

c. $\mathbf{x}(t) = (1-t)\begin{pmatrix}1\\3\\2\end{pmatrix} + t\begin{pmatrix}3\\1\\3\end{pmatrix}$

d. $\mathbf{x}(t) = (1-t)\begin{pmatrix}1\\3\\2\end{pmatrix} + t\begin{pmatrix}4\\4\\5\end{pmatrix}$

e. None of these

2. If a curve C is parametrized in polar coordinates by $r = r(t)$ and $\theta = \theta(t)$, where $a \le t \le b$, then it follows from the chain rule that its length in the (x,y)-plane is given by the formula

$$L(C) = \int_a^b \sqrt{\left(\frac{dr}{dt}\right)^2 + r^2\left(\frac{d\theta}{dt}\right)^2}\, dt.$$

Consider the curve C parametrized by $r = e^{-t}$, $\theta = t$, for $0 \le t \le 2\pi$. The length of this curve in the (x,y)-plane is

a. $1 - e^{-2\pi}$

b. $1 + e^{-2\pi}$

c. $\sqrt{2}(1 - e^{-2\pi})$

d. $\sqrt{2}(1 + e^{-2\pi})$

e. None of these

$$= \int_0^{2\pi} \sqrt{2e^{-2t}}\, dt = \int_0^{2\pi} \sqrt{2}\, e^{-t}\, dt$$

$$= -\sqrt{2}\, e^{-t}\Big|_0^{2\pi} = \sqrt{2}\,(1 - e^{-2\pi})$$