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Mathematics 5B Spring 2011: Lecture Quiz 3

April 29, 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 unit-speed parametrization of the circle in \mathbb{R}^2 centered at the point $(3, 2)$ of radius 5 is

a. $\mathbf{x}(t) = \begin{pmatrix} 3 + 5 \cos(s/5) \\ 2 + 5 \sin(s/5) \end{pmatrix}$

b. $\mathbf{x}(t) = \begin{pmatrix} 3 + 5 \cos(s/\sqrt{5}) \\ 2 + 5 \sin(s/\sqrt{5}) \end{pmatrix}$

c. $\mathbf{x}(t) = \begin{pmatrix} 3 + 5 \cos(s) \\ 2 + 5 \sin(s) \end{pmatrix}$

d. $\mathbf{x}(t) = \begin{pmatrix} 3 + 5 \cos(\sqrt{5}s) \\ 2 + 5 \sin(\sqrt{5}s) \end{pmatrix}$

e. None of these

2. If the curve C in the (x, y) -plane is parametrized by $\mathbf{x} : [0, 1] \rightarrow \mathbb{R}^2$, where

$$\mathbf{x}(t) = \begin{pmatrix} x(t) \\ y(t) \end{pmatrix} = \begin{pmatrix} 2t \\ t^2 \end{pmatrix}, \text{ then } \int_C x ds = \int_0^1 2t \sqrt{4 + 4t^2} dt$$

a. $\sqrt{2}$

b. $(4/3)\sqrt{2}$

c. $(8/3)\sqrt{2}$

d. $(4/3)(2\sqrt{2} - 1)$

e. None of these

$$\begin{aligned} &\rightarrow = \int_0^1 2(t^2 + 1)^{\frac{1}{2}} (2t) dt \\ &= 2 \cdot \frac{2}{3} (t^2 + 1)^{\frac{3}{2}} \Big|_0^1 \\ &= \frac{4}{3} (2\sqrt{2} - 1) \end{aligned}$$