MA205 Lesson 35

Arc Length II

Monday, October 18, 2007

Outline

Quiz

You will have 10 minutes

Objectives and Readings

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1. Develop the formula for computing the arc length of a space curve.

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1. Review Stewart, Chapter 8, section 1, pages 547-552.

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1. Review Stewart, Chapter 8, section 1, pages 547-552.
2. Stewart, Chapter 13, section 3, pages 862-864 through example 2.

Think About and Mathematica

Think About

1. How are the derivatives of 2 dimensional functions different from the derivatives of 3 dimensional functions?
2. How does a rate of change over a period of time become a distance?
3. What types of things move along space curves?

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Mathematica Commands and Tasks You Need To Know

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Mathematica Commands and Tasks You Need To Know

1. No New Commands

Last Class Review - Vector Functions I and II

Questions?

Arc Length Refresher; What was Arc Length Again

1. $$L = \int_a^b \sqrt{1 + (\frac{dy}{dx})^2} dx$$

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or

Arc Length Refresher; What was Arc Length Again

1. $$L = \int_a^b \sqrt{1 + (\frac{dy}{dx})^2} dx$$

or

2. $$L = \int_c^d \sqrt{1 + [g'(y)]^2} dy$$

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$= \sqrt{(x'(t))^2 + (y'(t))^2 + (z'(t))^2} = \sqrt{(\frac{dx}{dt})^2 + (\frac{dy}{dt})^2 + (\frac{dz}{dt})^2}$

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4. So $L = \int_a^b \sqrt{(x'(t))^2 + (y'(t))^2 + (z'(t))^2}dt$
5. Or $L = \int_a^b |\vec{r}'(t)|dt$

Outline

Predator was a Mathematician?

Video: You be the judge!

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The Dreaded Thayer Board Work

1. MBP 2 Graph the following parametric curve and find its exact length over the specified interval. Use Technology.

$$x = e^t - t,\ y = 4e^{\frac{t}{2}},\ -8 \leq t \leq 3$$

2. MBP 3 Without technology find the exact length of the curve over the specified interval.

$$\vec{r}(t) = \langle 2\sin t, 5t, 2\cos t \rangle,\ -10 \leq t \leq 10$$

Motion in Space

1. Look at Stewart, Chapter 13, section 14, Example 5, pg 873 - Mortar Fire
2. If a nine iron lofts a golf ball at an angle of 60°, how fast would you have to swing in order to hit the ball 30 feet?

Questions

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