

Homework questions for Chapter 14

Math 114, Spring 2008

1. Find the angle between the curves

$$\mathbf{r}_1(t) = (t, t^2, t^3)$$

$$\mathbf{r}_2(s) = (2 + s, 3 + 2s, s^2)$$

at their point of intersection. (If necessary, you may use a calculator to estimate the angle.)

- A) The angle is close to 5°
- B) The angle is close to 35°
- C) The angle is close to 45°
- D) The angle is close to 65°
- E) The angle is close to 95°
- F) The curves do not intersect

2. Find the arc length of the segment of the curve

$$\mathbf{r}(t) = (\sqrt{2} \ln t, t, t^{-1})$$

for the parameter values $1 \leq t \leq 2$.

- A) $\frac{1}{2}$ B) 1 C) $\frac{3}{2}$ D) 2 E) $\frac{5}{2}$ F) 3

3. Find the x -coordinate of the point of greatest curvature for the graph of $f(x) = \ln x$.
(Make sure to simplify the formula for curvature κ before you try to maximize its value.)

Vizually verify your solution by plotting the graph on a calculator or in Maple.

- A) e^{-1} B) $\frac{1}{2}\sqrt{2}$ C) 1 D) $\sqrt{3}$ E) e F) $e + e^{-1}$