MATH 237: Vector Calculus

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1. Consider the curves traced out by the vector-valued functions

$$\mathbf{s(t)} = \langle 13, 2, 4\rangle + t\langle 5, 3, \sqrt{7}\rangle \qquad 0 \leq t \leq 1$$

and

$$\mathbf{r}(t) = \langle \cos t, \sin t, t\rangle, 0 \leq t \leq 2\pi$$

   (a) What are the lengths of these curves?

   (b) Can you redescribe the curves so that the distance traveled is the same as the time interval?

2. Find the length of the curve traversed by

$$\mathbf{r}(t) = \langle t, \frac{\sqrt{2}}{2}t^2, \frac{1}{3}t^3\rangle \qquad 0 \leq t \leq 3\sqrt{2}$$

3. Find the average value of the function $T(x, y, z) = x^2y^2z^2$ along the curve above.