

Quiz 3-Solution

16.1 # 14 Find the line integral of
 $f(x, y, z) = \sqrt{3} / (x^2 + y^2 + z^2)$ over the curve
 $r(t) = ti + tj + tk, \quad 1 \leq t \leq \infty.$

$$\frac{dr}{dt} = i + j + k \Rightarrow \left| \frac{dr}{dt} \right| = \sqrt{1+1+1} = \sqrt{3}$$

$$f(x, y, z) = \frac{\sqrt{3}}{x^2 + y^2 + z^2} = \frac{\sqrt{3}}{t^2 + t^2 + t^2} = \frac{\sqrt{3}}{3t^2} = f(g(t), h(t), k(t))$$

$$\Rightarrow \int_C f(x, y, z) ds = \int_1^{\infty} \left(\frac{\sqrt{3}}{3t^2} \right) \sqrt{3} dt$$

$$= \left[-\frac{1}{t} \right]_1^{\infty} = \lim_{b \rightarrow \infty} \left(-\frac{1}{b} + 1 \right) = 1$$

Total Points = 10