

Quiz 3

April 18, 2013

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1. DERIVE the arclength formula for a polar curve $r = f(\theta)$, $a \leq \theta \leq b$.
2. In spherical system. $\rho > 0, 0 \leq \varphi \leq \pi, 0 \leq \theta < 2\pi$, what is the Cartesian coordinate corresponding to the point $\rho = 1, \phi = \pi/2, \pi/3$? What is the cylindrical coordinate for this point?
3. True or False? Explain.
If for each $\theta \in [0, 2\pi]$, $g(t) = f(t \cos \theta, t \sin \theta)$ is continuous at $t = 0$. Then $f(x, y)$ is continuous at $(0, 0)$.
4. Let $f(x, y) = x + 2y + x^2 + y^2$, find a linear function $L(x, y) = ax + by + c$ such that
$$\lim_{(x,y) \rightarrow (0,0)} \frac{f(x, y) - L(x, y)}{\sqrt{x^2 + y^2}} = 0.$$
 First, find a, b, c and then show that the limit above is actually true using the $\epsilon - \delta$ argument.
5. Evaluate $\frac{d}{dy} \int_1^{2+\sin(y)} \frac{\cos(xy)}{x} dx$

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