HOMEWORK 6

NAME:_____

Problem 1: Integrate $f(x,y,z) = x + \sqrt{y} - z^2$ over the path from $(0,0,0)$ to $(1,1,1)$ given by $t \mapsto (t^2, t^2, t^2)$ for $t \in [0,1]$.

Problem 2: Find the arc length of the cardioid $r = 2 + 2\cos(\theta)$.

Problem 3: Let C be the ellipse in which the plane $2x + 3y - z = 0$ meets the cylinder $x^2 + y^2 = 12$. Show, without evaluating line integrals directly, that the circulation of the field $F = x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$ around C in either orientation is zero.

Problem 4: Let $\mathbf{F}$ be the vector field $-y\mathbf{j} + x\mathbf{i}$. Integrate $\mathbf{F}$ along the square with vertices $(\pm 1, \pm 1)$ with counterclosewise orientation.

Problem 5: Find the integral of the form $\sqrt{x+y}\,dx$ along the triangle with vertices $(0,0),(1,3),(0,3)$ in counterclockwise orientation.