Math 20550 Calculus III Tutorial **Name:** _____
April 7, 2016

Tutorial Worksheet

Show all your work.

1. Evaluate $\int_C x^2dx + y^2dy$, where C consists of the arc of the circle $x^2 + y^2 = 4$ from $(2, 0)$ to $(0, 2)$ followed by the line segment frome $(0, 2)$ to $(4, 3)$.

2. Compute $\int_C x^2ds$, C is the intersection of the surface $x^2 + y^2 + z^2 = 4$ and the plane $z = \sqrt{3}$.

3. Evaluate $\int_C \nabla f d\mathbf{r}$ where $f(x, y, z) = \cos \pi x + \sin \pi y - xyz$ and C is any path that starts at $\left(1, \frac{1}{2}, 2\right)$ and ends at $(2, 1, -1)$.

4. Find a function f such that $\mathbf{F} = \nabla f$ and evaluate $\int_C \mathbf{F} \cdot d\mathbf{r}$ along the curve C. Where $\mathbf{F}(x, y, z) = (y^2 z + 2xz^2)\mathbf{i} + 2xyz\mathbf{j} + (xy^2 + 2x^2 z)\mathbf{k}$, C: $x = \sqrt{t}$, $y = t + 1$, $z = t^2$, $0 \leq t \leq 1$.