## 234 Quiz 10

Section: Name:
20 minutes. You can get 10 points at most.

1. Consider the parabola $y=x^{2}$. Let $\mathcal{C}$ be the part from $y=1$ to $y=4$ in the first quadrant.
(a). (5) Compute $\int_{\mathcal{C}} x d s$.
(b). (1) Is $\int_{\mathcal{C}} x y d x=\left.\frac{1}{2} x^{2} y\right|_{(1,1)} ^{(2,4)}=\frac{1}{2} 4 * 4-\frac{1}{2} 1 * 1$ correct or wrong?
2. (5) Consider the gravitational potential energy of a satellite near the Earth $\phi=-D / r$ where $r$ is the distance from the center of the Earth. (By physics, $D=G M m$ is a constant but you don't need this expression here.) The gravitational force is $\vec{F}=-\nabla \phi$. Let $\mathcal{C}$ be the line segment from $(1,1,1)$ to $(2,2,2)$. Compute $\int_{\mathcal{C}} \vec{F} \cdot d \vec{x}$ and verify it's $\phi(1,1,1)-\phi(2,2,2)$.
