Quiz 10 Calculus III Fall 2015

Names:..
Solve the following problems. Each problem is worth 5 points.

Q1. Let $f(x,y) = ye^{x^2}$, and let $\mathcal{C}$ be the line segment from $(0,0)$ to $(1,2)$.

(a.) Evaluate the line integral $\int_{\mathcal{C}} f(x,y)\,ds$.

(b.) Evaluate the line integral $\int_{\mathcal{C}} f(x,y)\,dx$.

(c.) Evaluate the line integral $\int_{\mathcal{C}} f(x,y)\,dy$.

Q2. Let $\mathbf{F}(x, y) = xy^2\,\mathbf{i} + (x^2y + 2y)\,\mathbf{j}$.

(a.) Find the domain of $\mathbf{F}(x, y)$ and show that $\mathbf{F}(x, y)$ is a conservative vector field.

(b.) Find the potential $g(x, y)$ of $\mathbf{F}(x, y)$.

(b.) Use the potential $g(x, y)$ from part **(b.)** to compute the line integral

$$\int_C \mathbf{F} \cdot d\mathbf{r}$$

where C is the half circle in the right half space from $(0, 1)$ to $(0, -1)$.

(Hint: Fundamental Theorem of Calculus for line integrals).