Quiz 2 **Calculus 3** **Due by 11/4/20**

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Compute $\int_C \vec{F} \cdot d\vec{r}$ for the vector field $\vec{F}(x,y) = xy\vec{i} - y\vec{j}$ and with C a line segment from (1,2) to (3,0).

I. $x(t) = 1 + 2t$ $\quad \vec{r}(t) = \langle 1+2t, 2-2t \rangle \quad 0 \le t \le 1$
$y(t) = 2 - 2t$

II. $\vec{F}(\vec{r}(t)) = \langle (1+2t)(2-2t), -(2-2t) \rangle = \langle (2-2t+4t-4t^2), (-2+2t) \rangle$
$\langle (2+2t-4t^2), (-2+2t) \rangle$

III. $\vec{r}'(t) = \langle 2, -2 \rangle$

IV. $\int_0^1 \langle (2+2t-4t^2, (-2+2t) \rangle \cdot \langle 2, -2 \rangle dt$

V. $\int_0^1 (4+4t-8t^2+4-4t)dt = \int_0^1 (8-8t^2)dt$

$\Big|_0^1 8t - \frac{8}{3}t^3 = 8 - \frac{8}{3} = 5\frac{1}{3} = \frac{16}{3}$

2. Compute $\int_C \vec{F} \cdot d\vec{r}$ for the vector field $\vec{F}(x,y) = \langle 5x^4y^2, 2x^5y \rangle$ and with C the counterclockwise arc of a circle beginning at (2,0) and ending at $(-\sqrt{2}, \sqrt{2})$.

potential function $\rightarrow f(x,y) = x^5y^2$

evaluated from $(2,0)$ to $(-\sqrt{2}, \sqrt{2})$

$x^5y^2 \Big|_{(2,0)}^{(-\sqrt{2},\sqrt{2})} = (-\sqrt{2})^5(\sqrt{2})^2 - (-\sqrt{2})^5(0)^2 = -8\sqrt{2}$