**Quiz 7 Calculus 3 11/10/2004**

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

1. Compute $\int_C \langle 2xe^y + 3x^2 + 2y, x^2e^y + 2x \rangle \cdot d\vec{r}$ for a path consisting of the first-quadrant portion of a circle (centered at the origin) of radius 5, traversed counterclockwise.

$\because \frac{\partial}{\partial x}(x^2e^y + x^3 + 2xy) = 2xe^y + 3x^2 + 2y$

$\frac{\partial}{\partial y}(x^2e^y + x^3 + 2xy) = x^2e^y + 2x$

$\therefore$ $\underline{x^2e^y + x^3 + 2xy}$ is the $\underline{\text{potential function}}$

and the starting point is $\underline{(5,0)}$ and the ending point is $\underline{(0,5)}$

$\therefore [x^2e^y + x^3 + 2xy]_{(5,0)}^{(0,5)} = -(25+125) = \underline{-150}$

Excellent

2. Compute $\int_C \langle \overset{f_x}{xy}, \overset{f_y}{2y} \rangle \cdot d\vec{r}$, where $C$ is the line segment from (0, 2) to the origin. $(0,0)$

$f_{xy} = x \neq 0 = f_{yx} \rightarrow$ there is no potential function

1. parametrize

$x(t) = 0t$

$y(t) = -2t + 2$

$\underline{\vec{F}(t) = \langle 0, -2t+2 \rangle}$

for $0 \leq t \leq 1$

2. $\vec{F}(\vec{r}(t)) = \langle 0(-2t+2), 2(-2t+2) \rangle$

$= \underline{\langle 0, -4t+4 \rangle}$

3. $\vec{r}\,'(t) = \underline{\langle 0, -2 \rangle}$

4. $\underline{\int_0^1 \langle 0, -4t+4 \rangle \cdot \langle 0, -2 \rangle \, dt}$

$\int_0^1 0 + (8t - 8)\, dt$

$\int_0^1 (8t-8)\, dt$

$4t^2 - 8t \Big|_0^1$

$4(1)^2 - 8(1) - 0$

$4 - 8 = -4$

Nice