Name: SOLUTIONS

Quiz #8 - November 11, 2008

1. Evaluate the line integral $\int_C xe^y\, dx$ where C is the arc of the curve $x = e^y$ from $(1, 0)$ to $(e, 1)$.

Parameterize C as (e^t, t) for $0 \le t \le 1$. Then $dx = e^t dt$ so we get:

$$\int_0^1 e^t e^t e^t dt = \int_0^1 e^{3t} dt = (1/3e^{3t})_0^1 = \frac{e^3 - 1}{3}.$$

2. Find the work done by the force $F(x, y) = (2x, y)$ moving a particle along the curve (t, t^2) from the point $(1, 1)$ to the point $(2, 4)$.

Work $= \int_1^2 F(r(t)) \cdot r'(t)dt$ which is:

$$\int_1^2 (2t, t^2) \cdot (1, 2t)dt = \int_1^2 2t + 2t^3 dt = (t^2 + t^4/2)_1^2 = (12 - 3/2) = 23/2.$$