Quiz 11 (20mins, 30pts)

Please write down your name, SID, and solutions discernably.

Name : SID : Score :

1. (10pts) Evaluate the line integral.

$$\int_C e^x dx,$$

where C is the arc of the curve $x = y^3$ from $(-1, -1)$ to $(1, 1)$.

2. (10pts) Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$.

$$\mathbf{F}(x, y) = (x + y)\mathbf{i} + (y - z)\mathbf{j} + z^2\mathbf{k},$$

where C is given by the vector function $\mathbf{r}(t) = t^2\mathbf{i} + t^3\mathbf{j} + t^2\mathbf{k}$, $0 \leq t \leq 1$.

3. (10pts) Find a function f such that $\mathbf{F} = \nabla f$ and use f to evaluate $\int_C \mathbf{F} \cdot d\mathbf{r}$ along the given curve C.

$$\mathbf{F}(x, y, z) = yze^{xz}\mathbf{i} + e^{xz}\mathbf{j} + xye^{xz}\mathbf{k}, \quad C : \mathbf{r}(t) = (t^2 + 1)\mathbf{i} + (t^2 - 1)\mathbf{j} + (t^2 - 2t)\mathbf{k}, \quad 0 \leq t \leq 2$$