INDEPENDENCE OF PATH

For each vector field below, evaluate $\int_C \vec{F} \cdot d\vec{r}$ where C is any path from $(0,0)$ to $(1,1)$.

1. $\vec{F} = x\hat{i} + y\hat{j}$

2. $\vec{F} = y\hat{i} + x\hat{j}$

3. $\vec{F} = \cos(x)\hat{i} + \sin(y)\hat{j}$

4. $\vec{F} = (e^x + y^2)\hat{i} + (\cos y + 2xy)\hat{j}$

5. $\vec{F} = (3xy^2 + 5)\hat{i} + (3 + 3x^2 y)\hat{j}$