Classroom Voting Questions: Multivariable Calculus

18.2 Computing Line Integrals Over Parameterized Curves

1. Which of the following is equivalent to the line integral of $\vec{F}(x, y)$ on the line segment from (1,1) to (3,4)?

   (a) $\int_0^1 \vec{F}(1+2t, 1+3t)dt$

   (b) $\int_0^1 \vec{F}(1+2t, 1+3t) \cdot (2\hat{i} + 3\hat{j})dt$

   (c) $\int_0^1 \vec{F}(3, 4) \cdot (2\hat{i} + 3\hat{j})dt$

   (d) $\int_0^1 \vec{F}(1+t, 1+t) \cdot (2\hat{i} + 3\hat{j})dt$

2. Which of the following is equivalent to the line integral of $\vec{F}(x, y)$ on the line segment from (1,1) to (3,4)?

   (a) $\int_0^2 \vec{F}(1+t, 1+1.5t) \cdot (\hat{i} + 1.5\hat{j})dt$

   (b) $\int_0^2 \vec{F}(1+t, 1+1.5t) \cdot (2\hat{i} + 3\hat{j})dt$

   (c) $\int_0^1 \vec{F}(1+t, 1+1.5t) \cdot (\hat{i} + 1.5\hat{j})dt$

   (d) $\int_0^1 \vec{F}(1+t, 1+1.5t) \cdot (2\hat{i} + 3\hat{j})dt$

3. If C_1 is the path parameterized by $\vec{r}_1(t) = \langle t, t \rangle$, $0 \leq t \leq 1$, and if C_2 is the path parameterized by $\vec{r}_2(t) = \langle t^2, t^2 \rangle$, $0 \leq t \leq 1$, and if $\vec{F} = x\hat{i} + y\hat{j}$, which of the following is true?

   (a) $\int_{C_1} \vec{F} \cdot d\vec{r} > \int_{C_2} \vec{F} \cdot d\vec{r}$

   (b) $\int_{C_1} \vec{F} \cdot d\vec{r} < \int_{C_2} \vec{F} \cdot d\vec{r}$

   (c) $\int_{C_1} \vec{F} \cdot d\vec{r} = \int_{C_2} \vec{F} \cdot d\vec{r}$

4. If C_1 is the path parameterized by $\vec{r}_1(t) = \langle t, t \rangle$, $0 \leq t \leq 1$, and if C_2 is the path parameterized by $\vec{r}_2(t) = \langle 1-t, 1-t \rangle$, $0 \leq t \leq 1$, and if $\vec{F} = x\hat{i} + y\hat{j}$, which of the following is true?

   (a) $\int_{C_1} \vec{F} \cdot d\vec{r} > \int_{C_2} \vec{F} \cdot d\vec{r}$

(b) $\int_{C_1} \vec{F} \cdot d\vec{r} < \int_{C_2} \vec{F} \cdot d\vec{r}$

(c) $\int_{C_1} \vec{F} \cdot d\vec{r} = \int_{C_2} \vec{F} \cdot d\vec{r}$

5. If C_1 is the path parameterized by $\vec{r}_1(t) = \langle t, t \rangle$, $0 \leq t \leq 1$, and if C_2 is the path parameterized by $\vec{r}_2(t) = \langle \sin t, \sin t \rangle$, $0 \leq t \leq 1$, and if $\vec{F} = x\hat{i} + y\hat{j}$, which of the following is true?

   (a) $\int_{C_1} \vec{F} \cdot d\vec{r} > \int_{C_2} \vec{F} \cdot d\vec{r}$

   (b) $\int_{C_1} \vec{F} \cdot d\vec{r} < \int_{C_2} \vec{F} \cdot d\vec{r}$

   (c) $\int_{C_1} \vec{F} \cdot d\vec{r} = \int_{C_2} \vec{F} \cdot d\vec{r}$

6. Consider the path C_1 parameterized by $\vec{r}_1(t) = (\cos t, \sin t)$, $0 \leq t \leq 2\pi$ and the path C_2 paramterized by $\vec{r}_2(t) = (2\cos t, 2\sin t)$, $0 \leq t \leq 2\pi$. Let $\vec{F}$ be a vector field. Is it always true that $\int_{C_2} \vec{F} \cdot d\vec{r} = 2\int_{C_1} \vec{F} \cdot d\vec{r}$?

   (a) Yes

   (b) No

7. Consider the path C_1 parameterized by $\vec{r}_1(t) = (\cos t, \sin t)$, $0 \leq t \leq 2\pi$ and the path C_2 paramterized by $\vec{r}_2(t) = (\cos 2t, \sin 2t)$, $0 \leq t \leq 2\pi$. Let $\vec{F}$ be a vector field. Is it always true that $\int_{C_2} \vec{F} \cdot d\vec{r} = 2\int_{C_1} \vec{F} \cdot d\vec{r}$?

   (a) Yes

   (b) No