

17.1 HW

1. $\oint_C xy dx + y dy \quad c=1$

$$\int_0^{2\pi} (-\cos\theta \sin^2\theta \cdot 1 \cdot d\theta + \sin\theta \cos\theta d\theta) = 0$$

$$\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \left(\frac{dy}{dx} - \frac{dy}{dx} \right) dA$$

$$\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} -x dy dx = 0$$

3. $\oint_C y^2 dx + x^2 dy \quad P(x,y) = y^2 \quad Q(x,y) = x^2$

$$\iint_D (Q_x - P_y) dA = \iint_D (2x - 2y) dA$$

$$\int_0^1 \int_0^1 (2x - 2y) dx dy = 0$$

5. $\oint_C x^2 y dx \quad P(x,y) = x^2 y, \quad Q(x,y) = 0$

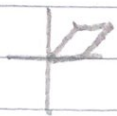
$$\iint_D (Q_x - P_y) dA$$

$$\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} -x^2 dy dx = -x/4$$

7. $\oint_C F \cdot dr, \quad F(x,y) = \langle x^2, x^2 \rangle$

$$P(x,y) = x^2 \quad Q(x,y) = x^2 \quad \int_0^1 \int_{x^2}^x 2x dy dx = \frac{1}{6}$$

9. $F = \langle e^{x+y}, e^{x-y} \rangle$



A: (0,0)
B: (2,2)
C: (4,1)
D: (2,-1)

$$\oint_C e^{x+y} dx + e^{x-y} dy \quad P(x,y) = e^{x+y} \quad Q(x,y) = e^{x-y}$$

$$\int_0^2 \int_0^2 (e^{x-y} - e^{x+y}) dx dy = \frac{-(e^2-1)(e^4-5)}{2}$$

13. $I = \int_C (\sin x + y) dx + (3x + y) dy \quad P(x,y) = \sin x + y \quad Q(x,y) = 3x + y$

$$\int_0^2 \int_0^{2-x} 2 dy dx = 34$$

17.2 HW

1. $F = \langle 2xy, x+y+z \rangle$, $z = 1-x^2-y^2$, $x^2+y^2 \leq 1$
 $\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} (-2x+1-2x) dy dx = \pi$

3. $F = \langle e^{y-z}, 0, 0 \rangle$ $\text{curl } F = \langle 0, -e^{y-z}, -e^{y-z} \rangle$ $\int_0^1 \int_0^1 (-e^{y-z}) dx dy = e^{-1} - 1$

5. $F = \langle e^{xz} - y, e^{z^2} + x, \cos(xz) \rangle$ $F(1(t)) = \langle 1 - \cos t, 1 + 5 \sin t, 1 \rangle$
 $\text{curl } F = \langle -3e^{z^2} z^2, z(\sin(xz) + ze^{z^2}), z \rangle$

9. $\text{curl } F = \langle 0, 0, 0 \rangle$ $\iint_S \text{curl } F \cdot d\mathbf{s} = 0$

11. $F = \langle 3y, -2x, 3y \rangle$, $x^2+y^2=9$, $z=2$ $\text{curl } F = \langle 3, 0, -5 \rangle$ $\iint_S \text{curl } F \cdot d\mathbf{s} = -45\pi$

13. $F = \langle y, z, x \rangle$ $\{(x, y) \mid 0 \leq x \leq 3, 0 \leq y \leq 3\}$ $\iint_S \text{curl } F \cdot d\mathbf{s} = 0$