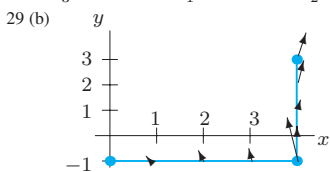


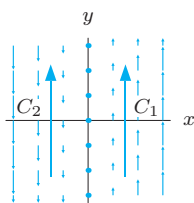
$$(-0.0025e^{3t} + 1.0025e^{-t})\vec{i} + (-0.005e^{3t} + 2.005e^{-t})\vec{j}$$

Section 18.1

- 1 Negative
- 3 Zero
- 5 Zero
- 7 0
- 9 0
- 11 28
- 13 16
- 15 -48
- 17 19/3
- 19 20
- 21 28
- 23 C_1 is pos; C_2, C_3 are zero
- 25 C_1 is neg; C_2 is neg; C_3 is zero
- 27 $\int_{C_3} \vec{F} \cdot d\vec{r} < \int_{C_1} \vec{F} \cdot d\vec{r} < \int_{C_2} \vec{F} \cdot d\vec{r}$



- 29 (b)
- (c) 60
- 31 $a > 0$
- 33 $b < 0$
- 35 $c > 3$
- 37 0
- 39 Negative
- 41 0
- 43 Yes
- 49 $-GMm/8000$
- 51 Sphere of radius a centered at the origin
- 53 (a) $\phi(\vec{r}) = -\frac{Q}{4\pi\epsilon} \frac{1}{a} + \frac{Q}{4\pi\epsilon} \frac{1}{|\vec{r}|}$
- (b) Because then $\phi(\vec{r}) = \frac{Q}{4\pi\epsilon} \frac{1}{|\vec{r}|}$
- 55 Value of a line integral is not a vector

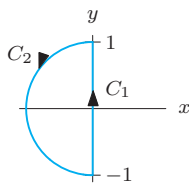


- 59 True
- 61 True
- 63 False
- 65 False
- 67 False

Section 18.2

- 1 $\int_0^\pi (\cos^2 t - \sin^2 t) dt$
- Other answers are possible

- 3 $\int_0^{2\pi} (-\sin t \cos(\cos t) \cos t \cos(\sin t)) dt$
- 5 24
- 7 -4
- 9 -6
- 11 9
- 13 82/3
- 15 12
- 17 116.28
- 19 12
- 21 21
- 23 0
- 25 $\int_C y^2 dx + z^2 dy + (x^2 - 5) dz$
- 27 $e^{-3y}\vec{i} - yz(\sin x)\vec{j} + (y+z)\vec{k}$
- 29 $18\pi^2$
- 31 -18π
- 33 (a)



- (b) 0; $-3\pi/2$
- 37 (a) -5
- (b) 5
- (c) 0
- 41 (a) Greater than zero
- (b) 88
- (d) $t = 2 \pm 1/\sqrt{3}$
- (e) 88; yes
- 43 Sign depends on C
- 45 $y = \pi/2, x = t, 0 \leq t \leq 3, \int_C \vec{F} \cdot d\vec{r} = 3$
- 47 True
- 49 True
- 51 False
- 53 False

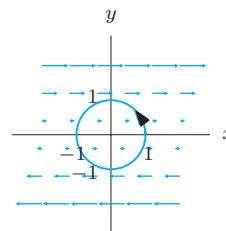
Section 18.3

- 1 12
- 3 Negative, not path-independent
- 5 Negative, not path-independent
- 7 Path-independent
- 9 Path-independent
- 11 Path-independent
- 13 $f(x, y) = x^2 y + K$
- 15 $f(x, y, z) = e^{xyz} + \sin(xz^2) + C$
 $C = \text{constant}$
- 17 -2
- 19 2
- 21 0
- 23 $e^3 - 1$
- 25 0
- 27 PQ
- 31 Yes
- 33 Yes.
- 35 $e^9 - 1$
- 37 (a) $-(1/3) - \pi$

- (b) $3\pi/4$
- 39 $9\pi/4$
- 41 $e^{9/2} + \sin(3\sqrt{2}) - 1$
- 43 107; 109.5
- 45 -2
- 47 (b) No
- 49 (a) $\int_{C_2} \vec{F} \cdot d\vec{r}$
- (b) $\int_{C_3} \vec{F} \cdot d\vec{r} < \int_{C_2} \vec{F} \cdot d\vec{r} < \int_{C_4} \vec{F} \cdot d\vec{r} < \int_{C_1} \vec{F} \cdot d\vec{r}$
- (c) $\int_{C_3} \vec{F} \cdot d\vec{r} = -\int_{C_4} \vec{F} \cdot d\vec{r} < 0$
- 51 -3.6
- 53 (a) \vec{a}
- (b) $\vec{r}_0 \cdot \vec{a}$
- (c) $10||\vec{a}||$
- 55 (a) $\pi/2$
- (b) No
- 57 (a) $\vec{F} - \text{grad } \phi = x \text{ grad } h$
- (b) 50
- 59 (a) $\vec{F} - \text{grad } \phi = x \text{ grad } h$
- (b) 384
- 63 (b) Yes
- 65 Only if \vec{F} is path-independent
- 67 $\vec{F} = \text{grad } f, f(x, y) = 50xy$
- 73 False
- 75 False
- 77 False
- 79 True
- 81 True
- 83 False

Section 18.4

- 1 No
- 3 No
- 5 $f(x, y) = x^3/3 + xy^2 + C$
- 7 Yes, $f = \ln A|xyz|$ where $A > 0$
- 9 No
- 11 -12
- 13 1/2
- 15 -3π
- 17 (a)



- (b) $-\pi$
- 19 $e - \cos 1$
- 21 $-9\pi/8$
- 23 (a) 0
- (b) 0
- (c) 0
- (d) -6π
- (e) -6π
- (f) 0
- (g) -6π