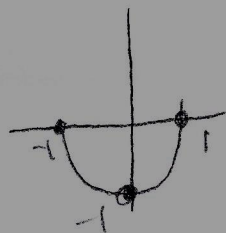


15.3

3, 7, 11, 15, 19, 23, 27, 31, 35, 39

(3)



$$r \in [0, 1]$$

$$-1 = \cos \theta$$

$$\theta = \pi$$

$$1 = \cos \theta$$

$$\theta = 0 = 2\pi$$

$$\theta \in [\pi, 2\pi]$$

$$\int_{\pi}^{2\pi} \int_0^1 f(r \cos \theta, r \sin \theta) r dr d\theta$$

(7)

$$\iint_D x^2 y dA$$

$$r \in [0, 5]$$

$$\theta \in [0, \pi]$$

$$\int_0^{\pi} \int_0^5 r^4 \cos^2 \theta \sin \theta dr d\theta = \int_0^{\pi} \left[\frac{1}{5} r^5 \cos^2 \theta \sin \theta \right]_0^5 d\theta$$

$$= \int_0^{\pi} 625 \cos^2 \theta \sin \theta d\theta = 625 \left[-\frac{\cos^3 \theta}{3} \right]_0^{\pi} = 625 \left[-\frac{-1}{3} + \frac{1}{3} \right] = \frac{1250}{3}$$

(11)

$$\iint_D e^{-x^2-y^2} dA$$

$$x = \sqrt{4-y^2}$$

$$y=0$$

$$x^2 + y^2 = 4$$

$$r=2$$

$$\theta \in \left[-\frac{\pi}{2}, \frac{\pi}{2} \right]$$

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \int_0^2 e^{-r^2} r dr d\theta$$

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \int_0^2 -\frac{1}{2} e^u du d\theta$$

$$= \int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left[\frac{1}{2} - \frac{1}{2} e^{-4} \right] d\theta$$

$$= \frac{1}{2} (1 - e^{-4}) \theta \Big|_{-\frac{\pi}{2}}^{\frac{\pi}{2}} = \frac{\pi}{2} (1 - e^{-4})$$

$$u = -r^2$$

$$du = -2r dr$$

$$-\frac{1}{2} du = r dr$$