

Quiz 11

15.1.25:

$$\begin{aligned}\iint_{[0, \frac{1}{2}] \times [0, \pi]} x \cos(xy) \cos^2(\pi x) dA &= \int_0^{\frac{1}{2}} \int_0^{\pi} x \cos(xy) \cos^2(\pi x) dy dx \\&= \int_0^{\frac{1}{2}} [\sin(xy) \cos^2(\pi x)]_0^{\pi} dx \\&= \int_0^{\frac{1}{2}} \sin(\pi x) \cos^2(\pi x) dx \\&= \left[-\frac{1}{3\pi} \cos^3(\pi x) \right]_0^{\frac{1}{2}} \\&= \frac{1}{3\pi}\end{aligned}$$

15.2.17:

$$\begin{aligned}\iint_R x^2 dA &= \int_4^8 \int_{\frac{16}{x}}^x x^2 dy dx \\&= \int_4^8 (x^3 - 16x) dx \\&= \left[\frac{1}{4}x^4 - 8x^2 \right]_4^8 \\&= 8^3 \cdot 2 - 8^3 - 4^3 + 2 \cdot 4^3 \\&= 8^3 + 4^3 = 2^9 + 2^6 = 64(8 + 1) = 576\end{aligned}$$

HB1:

$$\begin{aligned}\int_0^{\pi} \int_x^{\pi} \frac{\sin y}{y} dy dx &= \int_0^{\pi} \int_0^y \frac{\sin y}{y} dx dy \\&= \int_0^{\pi} \sin y dy \\&= [-\cos y]_0^{\pi} = 2\end{aligned}$$

Note: $0 \leq x \leq y \leq \pi$