MA111 - Tutorial 2
Final Answer Key

Tutorial Sheet No. 2

(1) (i) $\displaystyle\int_1^e \left(\int_{\ln y}^1 dx \right) dy$

(ii) $\displaystyle\int_{-1}^1 \left(\int_{x^2}^1 f(x,y) dy \right) dx$

(2) (i) 2, (ii) $\frac{1}{2}$(e−2)),

(iii) $\dfrac{\pi - 1}{2\pi} \ln 5 + 2(\tan^{-1} 2\pi - \tan^{-1} 2) - \dfrac{1}{2\pi} \left[\ln \dfrac{(4\pi^2 + 1)}{5} \right]$.

(3) e−1

(4) i) 4πabc / 3 ii) exp(1) - exp(-1)

(5) $\dfrac{\pi^4}{3}$

(6) $8 \ln 2$

(7) (i) π, (ii) $\dfrac{\pi}{4}$, (iii) π, (iv) $\dfrac{\pi}{4}$.

(8) $\dfrac{16a^3}{3}$

(9) 3π/2

(10) $\{(x, y, z) : -1 \le x \le 1, -\sqrt{1 - x^2} \le y \le \sqrt{1 - x^2}, \sqrt{x^2 + y^2} \le z \le 1\}$.

(11) $\dfrac{8\sqrt{2}}{15}$. We can also write D as

$$\left\{ (x, y, z) \in \mathbb{R}^3 : 0 \le z \le 2,\ 0 \le x \le \sqrt{z - y^2},\ 0 \le y \le \sqrt{z} \right\}.$$

(12) (i) $\pi/3$, (ii) $4\pi(e - 1)/3$.