(4) Evaluate $\int_{-1}^{2}\int_{x}^{x+2} dx\,dy$

$$= \int_{-1}^{2}\left(\int_{x}^{x+2} dy\right) dx$$

$$= \int_{-1}^{2} [y]_{x}^{x+2}\, dx$$

$$= \int_{-1}^{2} [\cancel{x}+2-\cancel{x}]\, dx$$

$$= \int_{-1}^{2} 2\, dx = 2\,[x]_{-1}^{2} = 2\,(2-(-1))$$

$$= 2(2+1) = 6.$$

(5) Evaluate $\int_{0}^{1}\int_{0}^{x} dy\,dx$

$$= \int_{0}^{1}\left(\int_{0}^{x} dy\right) dx$$

$$= \int_{0}^{1} [y]_{0}^{x}\, dx$$

$$= \int_{0}^{1} (x-0)\, dx$$

$$= \int_{0}^{1} x\, dx = \left[\frac{x^2}{2}\right]_{0}^{1} = \frac{1}{2} - 0$$

$$= \frac{1}{2}$$

(b) Evaluate $\int_0^1 \int_0^{x} (x^2+y^2)\,dx\,dy$

$$= \int_0^1 \left[\int_0^{x^2} (x^2+y^2)\,dy \right] dx$$

$$= \int_0^1 \left[x^2 y + \frac{y^3}{3} \right]_0^{x^2} dx$$

$$= \int_0^1 \left[x^2 (x^2 - 0) + \frac{1}{3} \left[(x^2)^3 - 0 \right] \right] dx$$

$$= \int_0^1 \left[x^4 + \frac{1}{3} x^6 \right] dx$$

$$= \left[\frac{x^5}{5} + \frac{1}{3} \frac{x^7}{7} \right]_0^1$$

$$= \frac{1}{5} + \frac{1}{21}$$

$$= \frac{21+5}{105}$$

$$\boxed{I = \frac{26}{105}}$$

7) Evaluate $\int_0^a \int_0^{\sqrt{a^2-x^2}} dy\,dx$

$$= \int_0^a \left[\int_0^{\sqrt{a^2-x^2}} dy \right] dx$$

$$= \int_0^a [y]_0^{\sqrt{a^2-x^2}} dx$$

$$= \int_0^a \sqrt{a^2-x^2}\, dx$$

$$= \left[\frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2}\sin^{-1}\left(\frac{x}{a}\right) \right]_0^a$$

$$= (0-0) + \frac{a^2}{2}\sin^{-1}\left(\frac{a}{a}\right) - \frac{a^2}{2}\sin^{-1}(0)$$

$$= \frac{a^2}{2}\sin^{-1}(1) - \frac{a^2}{2}\sin^{-1}(0)$$

$$= \frac{a^2}{2}\cdot\frac{\pi}{2} - 0$$

$$\boxed{I = \frac{\pi a^2}{4}}$$