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1-) $\int_{x=0}^{2}\int_{y=0}^{x^2} y\,dy\,dx$

$\int_{y=0}^{x^2} y\,dy = \frac{y^2}{2}\Big|_0^{x^2} = \frac{(x^2)^2}{2} - \frac{0^2}{2}$

$\frac{1}{2}\int_{x=0}^{2} \frac{x^4}{\cancel{2}} = \frac{1}{2}\Big|_0^2 \frac{x^5}{5} \quad \frac{1}{2}\left(\frac{2^5}{5} - \frac{\cancel{0}^5}{5}\right)$

$$\boxed{= \frac{1}{2}\cdot\frac{32}{5} = \frac{32}{10} = \frac{16}{5}}$$

2-) $\int_{x=0}^{1}\int_{y=0}^{2} (x+2)\,dy\,dx$

$\int_0^2 (x+2)\,dy \Big|_0^2 (x+2)\,y^0\,dy = (x+2)\,y\Big|_0^2$

$(x+2)(2-0) = (x+2)2 = 2x+4$

$2\int_0^1 x\,dx + 4\int \frac{x^2}{2}\,2\Big|_0^1 + 4\cdot x\Big|_0^1 =$

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$$\Big|_0^1 = 2\left(\frac{1^2}{2} - \frac{0}{2}\right) + 4(1-0) = 2.\frac{1}{2} + 4$$

$$\boxed{= 5}\ //$$

3-) $\int_0^1 \left[\int_2^3 x y^2 \, dy \right] dx$

$$\int_2^3 x y^2 \, dy = x \int_2^3 y^2 \, dy = x \frac{y^3}{3}\Big|_2^3 = x\left(\frac{3^3}{3} - \frac{2^3}{3}\right)$$

$$= x\left(\frac{27}{3} - \frac{8}{3}\right) = \frac{19}{3}x$$

$$\int_0^1 \frac{19}{3} x \, dx = \frac{19}{3}\int_0^1 x \, dx = \frac{19}{3} \cdot \frac{x^2}{2}\Big|_0^1$$

$$\frac{19}{3} \cdot \left(\frac{1^2}{2} - \frac{0^2}{2}\right) = \frac{19}{3} \cdot \frac{1}{2} = \boxed{\frac{19}{6}}\ //$$

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4.) $\int_1^2 \int_1^2 xy \, dy \, dx$

$\int_1^2 xy \, dy = x \int_1^2 y \, dy = x \frac{y^2}{2} \Big|_1^2$

$x \left(\frac{2^2}{2} - \frac{1^2}{2} \right) = x \left(\frac{4}{2} - \frac{1}{2} \right)$

$\frac{3}{2} x$

$\int_1^2 \frac{3}{2} \cdot x = \frac{3}{2} \int_1^2 x \, dx = \frac{3}{2} \cdot \frac{x^2}{2} \Big|_1^2$

$\frac{3}{2} \cdot \left(\frac{2^2}{2} - \frac{1^2}{2} \right) = \frac{3}{2} \cdot \frac{3}{2} = \boxed{\frac{9}{4}}$ //

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5-) $\int_0^4 \int_0^{\sqrt{x}} (x+y)\, dy\, dx$

$\int_0^{\sqrt{x}} (x+y)\, dy = \int_0^{\sqrt{x}} y\, dy = xy \Big|_0^{\sqrt{x}} + \frac{y^2}{2} \Big|_0^{\sqrt{x}} = x(\sqrt{x} - 0) + \left(\frac{\sqrt{x}}{2}\right)^2 - \cancel{\frac{0^2}{2}}$

$= x\sqrt{x} + \frac{x}{2} = x^1 x^{\frac{1}{2}} + \frac{x}{2} = x^{\frac{3}{2}} + \frac{x}{2}$

$\int_0^4 \left(x^{\frac{3}{2}} + \frac{x}{2}\right) dx = \int_0^4 x^{\frac{3}{2}} dx + \frac{1}{2} \int_0^4 x\, dx$

$\frac{2\sqrt{x^4}}{5}\Big|_0^4 + \frac{1}{2} \cdot x^2 \Big|_0^4 = \frac{2\sqrt{4^5}}{5} - \cancel{\frac{2\sqrt{0}}{5}}$

$+ \frac{1}{2}\left(\frac{4^2}{2} - \cancel{\frac{0^2}{2}}\right) = \frac{2\sqrt{1024}}{5} + \frac{16}{4} = \frac{64}{5} + 4$

$\boxed{= 16,8}$ //

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$$6 - \int_0^2 \int_0^{x-2} (x+y-1)\, dy\, dx$$

$$\int_0^{x-2} (x+y-1)\, dy = \left[xy + \frac{y^2}{2} - y \right]_0^{x-2} =$$

$$x = (x-2-0) + \frac{(x+2)^2}{2} - \cancel{\frac{0}{2}} - (x-2-0)$$

$$= x(x-2) + \frac{(x^2-4x+4)}{2} - (x-2) = \frac{x^2-2x}{1}$$

$$+ \frac{(x^2-4x+4)}{2} - \frac{x+2}{1} =$$

$$= 2x^4 - 4x - x^2 + 4x + 4 = 3x^2 - 10x + 8$$

$$= (x-2)^2 = (x-2)(x-2) = x^2 - 2x - 2x$$

$$+ 4 = x^4 - 4x + 4$$

$$\frac{1}{2} \left[\frac{8x^3}{\cancel{3}} - \frac{16x^2}{\cancel{2}} \right]_0^2 = \frac{1}{2} \left[x^3 - 5x^2 + 8x \right]_0^2$$

$$= \frac{1}{2} \left[2^3 - 5 \cdot 2^2 + 8 \cdot 2 - 0 + 5 \cdot 0 - 8 \cdot 0 \right.$$

$$= \frac{1}{2} (8 - 20 + 16) = \frac{1}{2} \cdot \frac{4}{1} = \frac{4}{2} = 2$$

7) $\int_0^3 \int_0^2 (4-y^2)\,dy\,dx = \int_0^3 \frac{16}{3}\,dx$

$= \frac{16}{3} \int_0^3 x^2\,dx = \frac{16}{3} \int_0^3 x^0\,dx$

$\frac{16}{3} \cdot x \Big|_0^3 = \frac{16}{3}(3-0) = \frac{16}{\cancel{3}} \cdot \cancel{3} = 16$ //

$\int_0^2 (4-y^2)\,dy = 4y - \frac{y^3}{3} \Big|_0^2 = 4 \cdot 2 - \frac{2^3}{3}$

$-\left(4 \cdot 0 - \frac{0^3}{3}\right) = \frac{8}{1} - \frac{8}{3} = \frac{24-8}{3} = \frac{16}{3}$

8-) $\int_0^{\pi}\int_1^2 x \cos(xy)\, dy\, dx = \int_0^{\pi}$
$[\operatorname{Sen}(2x) - \operatorname{Sen}(x)]\, dx =$
$= \int_0^{\pi} \operatorname{Sen}(2x)\, dx - \int_0^{\pi} \operatorname{Sen}(x)\, dx$

$= \dfrac{-\cos(2x)}{2}\Big|_0^{\pi} - [-\cos(x)]_0^{\pi}$

$= \dfrac{-\cos(2x)}{2}\Big|_0^{\pi} + \cos(x)\Big|_0^{\pi} = \dfrac{-\cos(2\pi)}{2}$

$- \left(\dfrac{-\cos(2 \cdot 0)}{2}\right) + \cos \pi - \cos 0$

$\dfrac{-\cos 2\pi}{2} + \dfrac{\cos 0}{2} + \cos \pi - \cos 0$

$= -\cancel{\tfrac{1}{2}} + \cancel{\tfrac{1}{2}} + (-1) - 1 = \boxed{-2}$ //

$\int_1^2 x \cos(xy)\, dy = x \int_1^2 \cos(xy)\, dy = \cancel{x}$.
$\dfrac{\operatorname{Sen}(xy)}{\cancel{x}}\Big|_1^2 = \operatorname{Sen}(2x) - \operatorname{Sen}(x)$.

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9-) $\int_0^1 \int_1^{e^x} dy\, dx = \int_0^1 \int_1^{e^x} 1\, dy\, dx =$

$\int_0^1 \int_1^{e^x} x\, y\, dy\, dx$

$= \int_0^1 e^x - 1\, dx = \int_0^1 e^x dx - \int_0^1 1\, dx = e^x \Big|_0^1 - x \Big|_0^1 = e^1 - e^0 - (1-0) = e - 1 - 1 =$

$\boxed{e-2}$ //

$\int_1^{e^x} x\, y\, dy = \int_1^{e^x} y\, dy = y \Big|_1^{e^x} = e^x - 1$

10) $\int_{\pi}^{\pi} \int_0^2 (x + \operatorname{sen}(y) + 1)\, dx\, dy =$

$= 4 \int_{\pi}^{\pi} y\, dy + 2 \int_{\pi}^{\pi} \operatorname{sen}(y)\, dy = 4y \Big|_{\pi}^{\pi}$

$+ 2 [-\cos(y)]_0^{\pi} = 4y \Big|_{-\pi}^{\pi} - 2\cos y \Big|_{-\pi}^{\pi}$

$= 4\pi - 4(\pi) - 2[\cos \pi - \cos(-\pi)] = 4\pi + 4\pi$

$-2[-1-(-1)] = 8\pi - 2(-1+1) = 8\pi - 20$

$= 8\pi$

6) $\int_0^2 (x + \text{sen}(y) + 1)\,dx = \int_0^2 x\,dx$

$+ \int_0^1 x\,\text{sen}(y)\,dx + \int_0^2 1\,dx$

$= \frac{x^2}{2}\Big|_0^2 + x\,\text{sen}(y)\Big|_0^2 + x\Big|_0^2 =$

$\left(\frac{2^2}{2} - \frac{0}{2}\right) + \left(2\,\text{sen}(y) - \cancel{0\,\text{sen}(y)}\right)$

$+ (2-0) = \frac{4}{2} + 2\,\text{sen}(y) + 2 =$

$2 + 2\,\text{sen}(y) + 2 = 4 + 2\,\text{sen}(y)$