1) If $f(x, y) = 2x + 3x^2 y$ find the following:

a) $\int_0^3 f(x, y)\ dx$

b) $\int_0^4 f(x, y)\ dy$

a) $\boxed{9 + 27y}$

b) $\boxed{8x + 24x^2}$

2) Calculate the following iterated integrals:

a) $\int_1^3 \int_0^1 (1 + 4xy)\ dx\, dy$

b) $\int_0^2 \int_0^{\pi/2} x \sin y\ dy\, dx$

c) $\int_0^1 \int_1^2 \frac{xe^x}{y}\ dy\, dx$

d) $\int_0^{\ln 2} \int_0^{\ln 5} e^{2x-y}\ dx\, dy$

a) $\boxed{10}$

b) $\boxed{2}$

c) $\boxed{\ln 2}$

d) $\boxed{6}$

3) Calculate the following double integrals:

a) $\iint_R (6x^2 y^3 - 5y^4)\, dA, \quad R = \{(x, y) \mid 0 \le x \le 3,\ 0 \le y \le 1\}$

b) $\iint_R \frac{xy^2}{x^2 + 1} dA, \quad R = \{(x, y) \mid 0 \le x \le 1,\ -3 \le y \le 3\}$

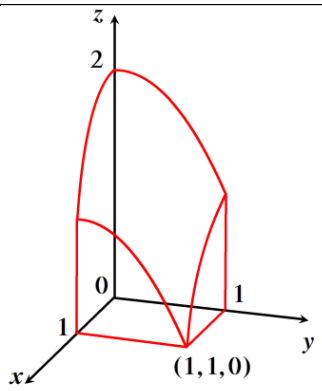
c) $\iint_R \frac{x}{1 + xy} dA, \quad R = [0,1] \times [0,1]$

a) $\boxed{\frac{21}{2}}$

b) $\boxed{9 \ln 2}$

c) $\boxed{2 \ln 2 - 1}$

4) Sketch the solid whose volume is given by the iterated integral $\int_0^1 \int_0^1 (2 - x^2 - y^2)\, dy\, dx$.



The solid is the region in the first octant which lies below the circular paraboloid $z = 2 - x^2 - y^2$ and above $[0,1]\times[0,1]$

5) Find the volume of the solid that lies under the hyperbolic paraboloid $z = 4 + x^2 - y^2$ and above the square $R = [-1,1]\times[0,2]$.

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6) Find the volume of the solid bounded by the elliptic paraboloid $z = 1 + (x-1)^2 + 4y^2$, the planes $x = 3$ and $y = 2$, and the coordinate planes.

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