1. $\int_0^3 \int_0^x \int_{x-y}^{x+y} ydzdydx$

   - $\int_{x-y}^{x+y} ydz =$
     $yz|_{x-y}^{x+y} =$
     $(x+y)y-(x-y)y = xy+y^2-xy+y^2 =$
     $2y^2$
   - $\int_0^x 2y^2dy =$
     $\left.\frac{2y^3}{3}\right|_0^x =$
     $\frac{2x^3}{3}$
   - $\int_0^3 \frac{2x^3}{3}dx =$
     $\left.\frac{2x^4}{12}\right|_0^3 =$
     $\frac{2\cdot 81}{12}$

2. $\int\int\int_E e^{\frac{z}{y}}dv, E = \{(x,y,z) \in \mathbb{R}^3 : 0 \le y \le 1, y \le x \le 1, 0 \le z \le xy\} =$
   $\int_0^1(\int_y^1(\int_0^{xy} e^{\frac{z}{y}}dz)dx)dy$

   - $\int_0^{xy} e^{\frac{z}{y}}dz =$
     $\left.ye^{\frac{z}{y}}\right|_0^{xy} =$
     $ye^x - y$
   - $\int_y^1 ye^x - ydx =$
     $ye^x - yx|_y^1 =$
     $ye^y - y^2 + ye + y$
   - $\int_0^1 ye^y - y^2 + ye + ydy =$
     $\left.-\frac{y^2}{2} + \frac{y^3}{3} + \frac{ey^2}{2} - e^y y + e^y\right|_0^1 =$
     $-\frac{7}{6} + \frac{e}{2}$

3. $\int\int\int_E xydV, E, y = x^2, x = y^2, z = 0, z = x + y$
   $D = \{(x,y,z) \in \mathbb{R}^3, 0 \le x \le 1 \wedge x^2 \le y \le \sqrt{x} \wedge 0 \le z \le x+y\}$
   $\int_0^1(\int_{x^2}^{\sqrt{x}}(\int_0^{x+y} xydz)dy)dx$

   - $\int_0^{x+y} xydz =$
     $xyz|_0^{x+y} =$
     $xy(x+y) = yx^2 + xy^2$
   - $\int_{x^2}^{\sqrt{x}} yx^2 + xy^2dy =$
     $\left.\frac{y^2x^2}{2} + \frac{xy^3}{3}\right|_{x^2}^{\sqrt{x}} =$
     $\frac{x^3}{2} + \frac{x\sqrt{x}^3}{3} - \frac{x^6}{2} - \frac{x^7}{3} =$
     $\frac{x^3}{2} + \frac{x^{\frac{5}{2}}}{3} - \frac{x^6}{2} - \frac{x^7}{3} =$
   - $\int_0^1 \frac{x^3}{2} + \frac{x^{\frac{5}{2}}}{3} - \frac{x^6}{2} - \frac{x^7}{3}dx =$
     $\left.\frac{x^4}{8} + \frac{x^{\frac{7}{2}}}{\frac{21}{2}} - \frac{x^7}{14} - \frac{x^8}{24}\right|_0^1 =$
     $\frac{1}{8} + \frac{1}{42} - \frac{1}{14} - \frac{1}{24} = \frac{1}{28}$

4. $\int\int\int_E xdV, E : x = 4y^2 + 4z^2 \wedge x = 4$
   $D = \{(x,y,z) \in \mathbb{R}^3, -1 \le y \le 1, 4y^2 \le x \le 4 \wedge -4y^2 \le z \le 4y^2\}$
   $\int_{-1}^1(\int_{4y^2}^4(\int_{-4y^2}^{4y^2} xdz)dx)dy$

- $\int_{-4y^2}^{4y^2} xdz =$
  $xz|_{-4y^2}^{4y^2} =$
  $4xy^2 + 4xy^2 =$
  $8xy^2$
- $\int_{4y^2}^{4} 8xy^2 dx =$
  $4x^2y^2|_{4y^2}^{4} =$
  $64y^2 - 16y^6$
- $\int_{-1}^{1} 64y^2 - 16y^6 dy =$
  $64 - 16 - 64 + 16$