$D : x^2 + z^2 = 4, y = -1, y + z = 4$

$\int_{-2}^{2}(\int_{-2}^{2}(\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} 1 dz) dy) dx$

- $\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} 1 dz =$

  $z|_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} =$

  $\sqrt{4-x^2} + \sqrt{4-x^2}$

- $\int_{-2}^{2} \sqrt{4-x^2} + \sqrt{4-x^2} dy =$

  $\sqrt{4-x^2}y + \sqrt{4-x^2}y \big|_{-2}^{2} =$

  $4\sqrt{4-x^2}$

- $\int_{-2}^{2} 4\sqrt{4-x^2} dx =$

  $2\arcsin\left(\frac{1}{2}x\right) + \sin\left(2\arcsin\left(\frac{1}{2}x\right)\right)\big|_{-2}^{2} =$

  $2\arcsin\left(\frac{1}{2}x\right) + \sin\left(2\arcsin\left(\frac{1}{2}x\right)\right) =$

  $8\pi$