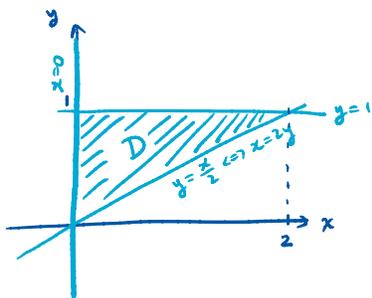


### 3 If we have time...

**Example 4.** Express  $\iiint_E \sin(x + yz) dV$  as an iterated integral, where  $E$  lies below the surface  $z = 1 + x^2 + 4y^2$  and above the region in the  $xy$ -plane bounded by the curves  $x = 2y$ ,  $x = 0$ , and  $y = 1$ .



$\hookrightarrow z = 0$   
 $u_1(x, y)$

$y = \frac{x}{2}$   
 $u_2(x, y)$

$$\iiint_E \sin(x + yz) dV = \iint_D \left[ \int_0^{1+x^2+4y^2} \sin(x + yz) dz \right] dA$$

$$= \int_0^2 \int_{x/2}^1 \int_0^{1+x^2+y^2} \sin(x + yz) dz dy dx \quad (D \text{ as Type I})$$

$$= \int_0^1 \int_0^{2y} \int_0^{1+x^2+y^2} \sin(x + yz) dz dx dy \quad (D \text{ as Type II})$$