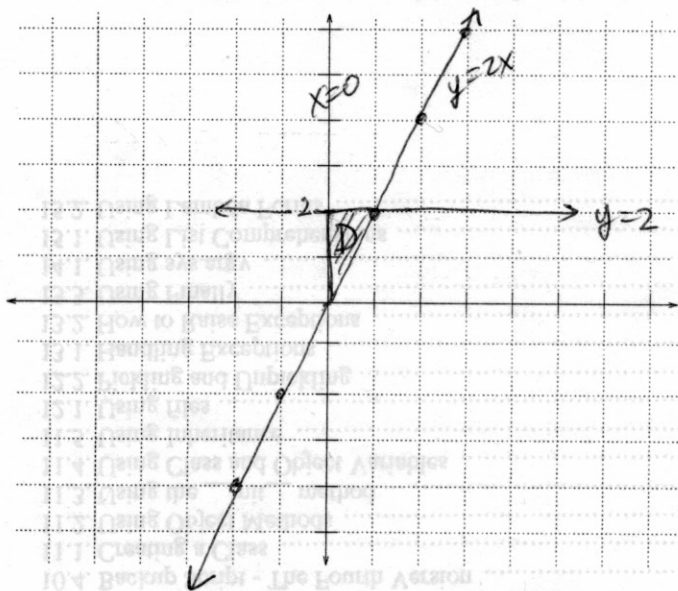


2. [20 points] First sketch the region of integration D and then calculate the integral

$$\iint_D \cos(y^2) dA$$

where D is bounded by the lines $y = 2x$, $y = 2$, and $x = 0$.



$$\iint_D \cos(y^2) dA = \int_0^2 \left(\int_0^{y/2} \cos(y^2) dx \right) dy$$

$$= \frac{1}{2} \int_0^2 y \cos(y^2) dy$$

let $u = y^2$

$du = 2y dy$

$$= \frac{1}{4} \int_0^4 \cos(u) du$$

$$= \frac{1}{4} \sin(u) \Big|_0^4 = \frac{1}{4} \sin(4) - 0$$