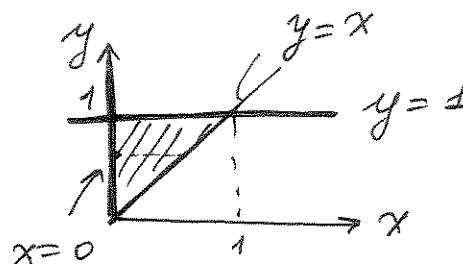QUIZ 1 (MATH 32B)    (Tuesday)

**Problem 1.** Find the volume of the solid bounded by $z = 2x + 3y^2$, $x = 0$, $y = 1$, $x = y$ and $z = 0$ in the first ~~quadrant~~.

octant.

Region of integration:



$$\text{Volume} = \int_0^1 \int_0^y (2x + 3y^2)\,dx\,dy =$$

$$= \int_0^1 (x^2 + 3y^2 x)\Big|_0^y dy = \int_0^1 (y^2 + 3y^3)\,dy =$$

$$= \int_0^1 (y^2 + 3y^3)\,dy = \left(\frac{y^3}{3} + \frac{3}{4}y^4\right)\Big|_0^1 = \frac{1}{3} + \frac{3}{4} = 1\frac{1}{12}$$

1

**Problem 2.** Evaluate the iterated integral:

$$I = \int_0^1 \int_0^x x \cos y \, dy \, dx.$$

$$I = \int_0^1 x \int_0^x \cos y \, dy \, dx = + \int_0^1 x \left( \sin y \Big|_0^x \right) dx = \int_0^1 x \sin x \, dx$$

$$\int x \sin x \, dx = -x \cdot \cos x + \int \cos x \, dx = -x \cos x + \sin x + C$$

$$u = x$$
$$dv = \sin x \, dx$$
$$du = dx$$
$$v = -\cos x$$

$$I = \left( -x \cos x + \sin x \right) \Big|_0^1 = -\cos 1 + \sin 1 \; ;$$