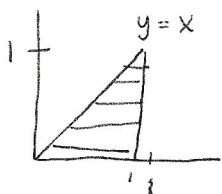


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 March 19, 2015
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Quiz 9

You must show all work to receive full credit!!

Problem 1. (6 pts) Evaluate by first changing the order of integration: $\int_0^1 \int_y^1 \frac{\sin x}{x} dx dy$.



$$0 \leq x \leq 1$$

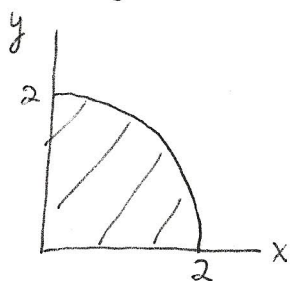
$$0 \leq y \leq x$$

$$\begin{aligned} \int_0^1 \int_0^x \frac{\sin x}{x} dy dx &= \int_0^1 \frac{\sin x}{x} y \Big|_{y=0}^x dx \\ &= \int_0^1 \frac{\sin x}{x} x dx = \int_0^1 \sin x dx \\ &= -\cos x \Big|_0^1 = -\cos 1 - (-\cos 0) \\ &= -\cos 1 + 1 \\ &= \boxed{1 - \cos(1)} \end{aligned}$$

Problem 2. (4 pts) Rewrite $\iiint_W x dV$ as an iterated integral, where W is the region in the first octant ($x \geq 0, y \geq 0, z \geq 0$) above $z = y^2$ and below $z = 8 - 2x^2 - y^2$. DO NOT EVALUATE.

$$y^2 \leq z \leq 8 - 2x^2 - y^2$$

Projection D of W onto xy -plane: find intersection $y^2 = 8 - 2x^2 - y^2$
 $\Rightarrow 2y^2 = 8 - 2x^2 \Rightarrow y^2 = 4 - x^2 \Rightarrow y = \pm \sqrt{4 - x^2}$. Since $y \geq 0$,
 just take $y = \sqrt{4 - x^2}$.



$$\begin{aligned} 0 &\leq y \leq \sqrt{4-x^2} \\ 0 &\leq x \leq 2 \end{aligned}$$

$$\boxed{\int_0^2 \int_0^{\sqrt{4-x^2}} \int_{y^2}^{8-2x^2-y^2} x dz dy dx}$$