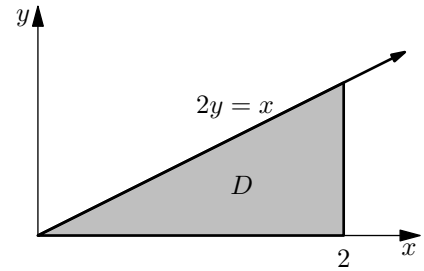


MATH 2110: Quiz #6 – SOLUTIONS

/5 **Problem 1:** Evaluate $\iint_D e^{x^2} dA$ where D is the triangular region bounded by the x -axis, $2y = x$ and $x = 2$.

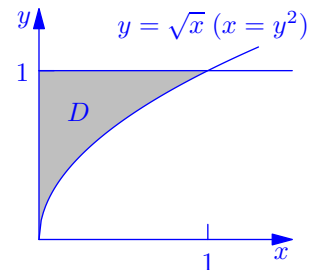
$$2y = x \iff y = x/2$$



$$\begin{aligned} \iint_D e^{x^2} dA &= \int_0^2 \int_0^{x/2} e^{x^2} dy dx \\ &= \int_0^2 e^{x^2} \underbrace{\int_0^{x/2} dy}_{x/2} dx \\ &= \int_0^2 \frac{1}{2} x e^{x^2} dx = \frac{1}{4} e^{x^2} \Big|_0^2 = \boxed{\frac{1}{4}(e^4 - 1)} \end{aligned}$$

/5 **Problem 2:** Change the order of integration to evaluate $\int_0^1 \int_{\sqrt{x}}^1 \sin(y^3) dy dx$.

$$y = \sqrt{x} \iff x = y^2$$



$$\begin{aligned} \int_0^1 \int_{\sqrt{x}}^1 \sin(y^3) dy dx &= \iint_D \sin(y^3) dA \\ &= \int_0^1 \int_0^{y^2} \sin(y^3) dx dy \\ &= \int_0^1 \sin(y^3) \underbrace{\int_0^{y^2} dx}_{y^2} dy \\ &= \int_0^1 y^2 \sin(y^3) dy = -\frac{1}{3} \cos(y^3) \Big|_0^1 = \boxed{\frac{1}{3}(1 - \cos 1)} \end{aligned}$$