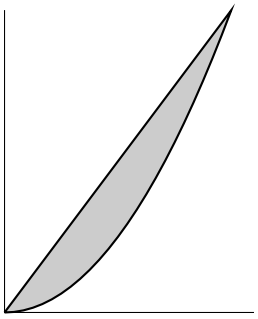
Group members:

Warm-up: let $f(x, y)$ be a function defined on the region D between the curves $y = x^2$ and $y = 2x$ in the xy-plane, pictured here:



Label the figure and set up two iterated integrals which compute the signed volume under $z = f(x, y)$ over the region D.

Problem 1. Find the signed volume under $f(x, y) = xy - x^2$ over the region D from the warmup.

Problem 2. Find the volume under the graph of $f(x, y) = x^2 + y^2$ over the square D with corners $(x, y) = (\pm 1, \pm 1)$.

Problem 3. Sketch the region of integration for the following iterated integral and then compute the integral:

$$\int_1^{-1} \int_x^{2x} e^{x+y} \, dy \, dx.$$

Problem 4. Sketch the region of integration for the following iterated integral and then compute the integral:

$$\int_0^2 \int_1^3 |x-2| \sin(y)\, dx\, dy.$$

Problem 5. Sketch the region of integration for the following iterated integral and then compute the integral:

$$\int_0^2 \int_x^2 e^{-y^2}\, dy\, dx.$$

Problem 6. Set up a double integral representing the volume under $z = 2 + \cos(y^2)$ over the triangle in the xy-plane with vertices $(0, 0), (0, 2)$ and $(6, 2)$. Then solve your double integral to find this volume.

Problem 7. Set up a double integral representing the area between $y = 1 - x^2$ and $y = x^2 - 3$. Then solve your double integral to find the area between these curves.