(1) Find the area in the $xy$-plane between the curves $y = x$ and $y = 2x^2 - x$. Write this both as a double and a single integral and explain why they are the same thing.

(2) Suppose that $D$ is the triangular region with vertices $(0, 0), (2, 4)$ and $(6, 0)$. Find

$$\int \int _D ye^x \, dA.$$ 

(3) Evaluate the following integral by reversing the order of integration:

$$\int_0^1 \int_{\sqrt{y}}^1 \sqrt{x^3 + 1} \, dx \, dy.$$ 

(4) Evaluate $\int_0^1 \int_0^1 e^{\max(x^2, y^2)} \, dx \, dy$, where $\max(x^2, y^2)$ means the larger of the two numbers $x^2$ and $y^2$.

(5) Switch the order of integration:

$$\int_{-3}^0 \int_{-x}^{x^2} f(x, y) \, dy \, dx.$$ 

(6) Suppose that $R$ is the region between the two curves $y = x^2 + 1$ and $y = 5x - 5$. Evaluate

$$\int \int _R x \, dA$$

(7) Find the volume of the solid bounded by the surfaces $z = 10 + y - x^2$, $y = x^2$, and $x = y^2$.

(8) Find the volume of the solid lying under $z = xy$ and above the triangle in the $xy$-plane with vertices $(1, 2), (1, 4)$ and $(5, 2)$. 
(9) Find the mass of a triangular lamina with vertices (0,0), (1,0) and (0,2) if the density is given by \( \rho(x, y) = 1 + 3x + y \).