1. Set up but do not evaluate the double integrals to compute the areas of the following:
   (a) (10 points) The unit semicircle above the x-axis.

Solution:

$$\int_{-1}^{1}\int_{0}^{\sqrt{1-x^2}} 1 \;\, dydx$$

   (b) (10 points) The region bounded by $x = y^2$ and $y = x - 2$.

Solution:

$$\int_{1}^{4}\int_{y^2}^{y+2} 1 \;\, dxdy$$

2. (20 points) Compute

$$\int_{0}^{1}\int_{y}^{1} e^{-x^2}\, dxdy$$

Here is a guided approach that you may optionally follow.

   (a) (5 points) Draw and shade the region
   (b) (5 points) Exchange the integrals with the aid of the picture drawn in the previous part.
   (c) (10 points) Compute the iterated integrals $\iint_R e^{-x^2}\, dydx$.

Solution:

$$\int_{0}^{1}\int_{y}^{1} e^{-x^2} \;\, dxdy = \int_{0}^{1}\int_{0}^{x} e^{-x^2} \;\, dydx = \int_{0}^{1} xe^{-x^2} dx$$

Then use the u-sub $u = -x^2$.

3. (20 points) For the region R bounded by the curves $x = y^2$ and $y = x$, compute

$$\iint_R 3x + 2y\, dA$$

Solution:

$$\iint_R 3x + 2y\, dA = \int_{0}^{1}\int_{y^2}^{y} 3x + 2y \;\, dxdy$$

or

$$= \int_{0}^{1}\int_{x}^{\sqrt{x}} 3x + 2y \;\, dydx$$