Math 2551 Worksheet Section 15.1 and 15.2

1. Find $\iint_R \dfrac{xy^2}{x^2+1}\, dA, \qquad R\text{: } 0 \le x \le 1,\ -3 \le y \le 3$

2. Write an iterated integral for $\iint_R \, dA$ over the region R using vertical cross-sections and horizontal cross-sections.

   (a) Bounded by $y = e^{-x}$, $y = 1$, and $x = \ln 3$.

   (b) Bounded by $y = x^2$ and $y = x + 2$

3. Sketch the region of integration, reverse the order of integration, and evaluate the integral.

   (a) $\displaystyle\int_0^{\sqrt{\pi}} \int_y^{\sqrt{\pi}} \cos(x^2)\, dx\, dy.$

   (b) $\displaystyle\int_0^8 \int_{\sqrt[3]{x}}^2 e^{y^4}\, dy\, dx.$

4. Find the volume of the solid bounded by the cylinder $y^2 + z^2 = 4$ and the planes $x = 2y$, $x = 0$, $z = 0$ in the first octant.