1. [EC 12.1.2] If $R = [1, 3] \times [0, 2]$, use a Riemann sum with $m = 4$, $n = 2$ to estimate the value of $\iint_R (y^2 - 2x^2)\, dA$. Take sample points to be the upper left corners of the squares.

2. [EC 12.1.{12,16,20}] Calculate the iterated integral.

   (a) $\int_2^4 \int_{-1}^1 (x^2 + y^2)\, dy\, dx$

   (b) $\int_0^1 \int_1^2 \frac{xe^x}{y}\, dy\, dx$

   (c) $\int_0^1 \int_0^1 xy\sqrt{x^2 + y^2}\, dy\, dx$

3. [EC 12.1.22] Calculate $\displaystyle\iint_R \cos(x + 2y)\, dA$ for $R = [0, \pi] \times [0, \pi/2]$.

4. [EC 12.2.8] Evaluate the double integral $\displaystyle\iint_D \frac{4y}{x^3 + 2}\, dA$ where $D = \{(x, y)\colon\ 1 \le x \le 2, 0 \le y \le 2x\}$.

5. [EC 12.2.24] Find the volume of the solid bounded by the cylinder $y^2 + z^2 = 4$ and the planes $x = 2y$, $x = 0$, and $z = 0$ in the first octant (where x, y, and z are all at least 0).