# MATH 243 Worksheet 5: 2D integrals

**Note:** Problems 1-4 are leftover problems from slides. Problems 5-x are brand new.

**1:** Evaluate $\iint_R f(x,y)\,dA$ for these functions and regions:
**a.** $f(x,y) = xcos^2(y), R = [0,3] \times [0,\pi/2]$
**b.** $f(x,y) = 2x - 4y^3, R = [4,5] \times [0,3]$
**c.** $f(x,y) = xy + \cos(x) + \sin(y), R = [0,1] \times [0,1]$

**1:** Evaluate $\iint_D f(x,y)\,dA$ for these functions and regions:
**a.** $f(x,y) = 4xy - y^3$, $D$ is region bound by $y = \sqrt{x}$ and $y = x^3$
**b.** $f(x,y) = x^2 - 2y$, $D$ is triangle with vertices $(0,3), (1,1), (5,3)$
**c.** $f(x,y) = e^{x/y}, D = \{(x,y) : 1 \leq y \leq 2, y \leq x \leq y^3\}$

**3:** Find the surface area of the portion of $z = xy$ in the cylinder given by $x^2 + y^2 = 1$

**4:** Find the center of mass of the following regions:
**a.** Portion of the unit disk lying in the 1st quadrant
**b.** Square $0 \leq x, y \leq \pi$ with weight function $f(x,y) = x\sin(x)y^3$