# MATH 243 Worksheet 6: Triple Integrals, Basic Line Integrals

**Note:** Problems 1-4 are leftover problems from slides. Problems 5-x are brand new, check back on July 2nd to see more problems.

**1:** Evaluate $\iiint_E f(x,y,z)\,dV$ for these functions and regions:
**a.** $f(x,y,z) = x$, $E$ is region under $2x + 3y + z = 6$ in the first octant.
**b.** $f(x,y,z) = \sqrt{3x^2 + 3z^2}$, $E$ is region bound by $y = 2x^2 + 2z^2$ and $y = 8$
**c.** $f(x,y,z) = yz$, $E$ is region bound by $x = 2y^2 + 2z^2 - 5, x = 1$
**d.** $f(x,y,z) = z$, $E$ is region inside $y^2 + z^2 = 1$ and between $x + y + z = 2, x = 0$
**e.** $f = x^2 + y^2$, $E$ is portion of $x^2 + y^2 + z^2 = 4$ with $y \geq 0$
**f.** $f = x^2$, $E$ is region inside $x^2 + y^2 + z^2 = 36$ and $z = -(3x^2 + 3y^2)^{1/2}$

**2:** Find the volume of the solid bound by $z = 8 - x^2 - y^2, z = -2\sqrt{x^2 + y^2}$, and $x^2 + y^2 = 4$

**3:** Evaluate $\int_C f\,ds$ for $f(x,y) = 16y^5$ where $C$ is $x = y^4$ from $y = 0$ to $y = 1$, followed by a segment from $(1,1)$ to $(1,-2)$, followed by a segment from $(1,-2)$ to $(2,0)$

**4:** Evaluate $\int_C (x^2 dy - yz dz)$ where $C$ is the segment from $(4,-1,2)$ to $(1,7,-1)$