Math 241 – Group 4 Review

Double Integrals – Evan Johnson

1. Evaluate in polar $\iint_R (4x + 2y^2)dA$ where R is the region in the first quadrant of the plane bounded by the circles $x^2+y^2=9$ and $x^2+y^2=4$
2. Evaluate the double integral $\iint_R (xy - 4x^2 + 12y^2)dA$ over the rectangle R = [0,7] X [0,5]
3. For the given double integral

$$\iint_R (3xy)dA$$

(a) Sketch the area of the function. The function is bounded by $y=x+2$, $y=x^2$

(b) Evaluate as Type 1 or Type 2

Triple Integrals – Ben Edwards

1. Evaluate the Integral $\iiint_R e^x e^y e^z$ dV bounded by the rectangular box R = [0,1]X[0,2π]X[ln(2),ln(4)]
2. Evaluate the integral $\int_{-4}^{8}\int_{0}^{2x}\int_{y}^{x-2} dzdydx$

Using Vector Functions to Find Triple Integrals (Tetrahedrons) – Russell Brown

1. Use a double or triple integral to compute the volume of the tetrahedron with the vertices at (0,0,0) , (3,0,0) , (0,4,0) , and (0,0,5)
2. Using triple integrals, find the volume of the solid bounded above by the tetrahedron with the vertices (0,0,0) , (3,0,0) , (0,3,0), and (0,0,2) and bounded below by the tetrahedron with the vertices (0,0,0) , (3,0,0) , (0,3,0), and (0,0,1).

Triple Integrals with Cylindrical Coordinates - Brian Wallis

1. Find the volume of the object bounded by cylinders $4 \le x^2 + y^2 \le 25$ and $z = \pm\sqrt{9x^2 + 9y^2}$

2. Find the volume of the solid bounded by the xy plane, $r = 5\cos\theta\,, and\ z = -4y$

Triple Integrals with Spherical Coordinates – Johnny Hayes

1. Find the volume of the object bounded by the xy plane, $x^2 + y^2 + z^2 = 16$ and the cone $\phi = \frac{\pi}{6}$
2. Find the volume of the object bounded above by $\rho \leq 16\ and\ z = 8$ below

Changes of Variables in Multiple Integrals – Mackenzie Kelly

1. (a) Find the Jacobian of the transformation x=u and y=uv and sketch the region G: $1 \leq u \leq 2\ and\ 1 \leq uv \leq 2$ in the uv plane.
   (b)Transform the integral into an integral over G and evaluate both integrals $\int_1^2 \int_1^2 \frac{y}{x}\,dydx$

2. Use a transformation to evaluate the integral $\iint_R (2x^2 - xy - y^2)dxdy$ for the region R in the first quadrant bounded by $y = -2x + 4$, $y = -2x + 7$,$y = x - 2$,$y = x + 1$

3. Find the Jacobian $\frac{\partial(x,y,z)}{\partial(u,v,w)}$ of the transformation $x = ucos(v)$, $y = usin(v)$,z=w

Line Integrals – Tom Wise

1. $f(x,y,z) = 5x^2 + 4y - \frac{z}{3}$ over the line segment joining (0,0,0),(1,2,3)
2. $f(x,y,z) = \frac{4}{3}y^2 - 7x^3 - z$ over the line segment joining (0,0,0),(5,7,9)