Question #1

Pick 1 questions, 0 pts per question

Question

(4 points) 1. Estimate $\int_R \int (xy^2 + 2x)\, dA$ where $R = [0,4] \times [0,4]$ by dividing *R* into four equal squares and evaluating the function at the upper right corner of each square.

Question

(4 points) 1. Estimate $\int_R \int (x^2y + 2y)\, dA$ where $R = [0,4] \times [0,4]$ by dividing *R* into four equal squares and evaluating the function at the upper right corner of each square.

Question #2

Pick 1 questions, 0 pts per question

Question

(6 points) 2. Evaluate the integral $\int_D \int (x^2 + 2y)\, dA$ where *D* is the region bounded $y = 2 - x^2$ and $y = x$ in the *xy*-plane.

Question #3

Pick 1 questions, 0 pts per question

Question

(7 points) 3. Sketch the region of integration and reverse the order of integration of the following integral. Then, evaluate the integral.

$\int_0^2 \int_0^{4-x^2} \frac{xe^{2y}}{4-y}\,dydx$

Question

(7 points) 3. Sketch the region of integration and reverse the order of integration of the following integral. Then, evaluate the integral.

$\int_0^3 \int_0^{9-x^2} \frac{xe^{3y}}{9-y}\,dydx$

Question #4

Pick 1 questions, 0 pts per question

Question

(7 points) 4. Use a double integral to find the area inside the cardioid $r = 2 - 2\cos\theta$ and outside the circle $r = 2$.

Question

(7 points) 4. Use a double integral to find the area inside the cardioid $r = 2 - 2\sin\theta$ and outside the circle $r = 2$.

Question #5 Pick 1 questions, 0 pts per question

Question

(7 points) 5. Find the area of the part of the surface $2y + 4z - x^2 = 5$ that lies above the region *D* in the *xy*-plane bounded the *x*-axis and the lines $y = 2x$ and $x = 2$.

Question #6 Pick 1 questions, 0 pts per question

Question

6. Given a thin plate *D* bounded by $y = x + 2$ and $y = x^2$ with a density function of $\rho(x, y) = kx^2$.

(2 points) a. Set up the integral that would compute the mass of *D*.

(2 points) b. Set up the integral that would compute M_y.

(2 points) c. Set up the integral that would compute I_x.

Note: You do not need to evaluate these integrals.

Question

6. Given a thin plate D bounded by $y = x + 6$ and $y = x^2$ with a density function of $\rho(x, y) = ky^2$.

(2 points) a. Set up the integral that would compute the mass of D.

(2 points) b. Set up the integral that would compute M_x.

(2 points) c. Set up the integral that would compute I_y.

Note: You do not need to evaluate these integrals.

Question #7 Pick 1 questions, 0 pts per question

Question

(7 points) 7. Use a triple integral to find the volume of the tetrahedron enclosed by the coordinate planes and the plane $4x + 3y + z = 12$.

Question

(7 points) 7. Use a triple integral to find the volume of the tetrahedron enclosed by the coordinate planes and the plane $3x + 5y + z = 15$.

Question #8 Pick 1 questions, 0 pts per question

Question

(7 points) 8. Use cylindrical coordinates to evaluate $\int\int\int_E yz\,dV$, where E lies above the plane $z = 0$, below the plane $z = y$, and inside the cylinder $x^2 + y^2 = 4$.

Question

(7 points) 8. Use cylindrical coordinates to evaluate $\int\int\int_E xz\,dV$, where E lies above the plane $z = 0$, below the plane $z = x$, and inside the cylinder $x^2 + y^2 = 9$.

Question #9 Pick 1 questions, 0 pts per question

Question

(7 points) 9. Use spherical coordinates to evaluate $\int\int\int_E xe^{x^2+y^2+z^2}\,dV$, where E is the portion of the unit sphere $x^2 + y^2 + z^2 \leq 1$ that lies in the first octant.

Question #10 Pick 1 questions, 0 pts per question

Question

(7 points) 10. Find the volume of the solid enclosed by $z = x^2 + y^2$ and $z = 2 - x^2 - y^2$.

Question #11

Pick 1 questions, 0 pts per question

Question

11. Given the integral $\int_D \int \frac{x-y}{x+y} dA$ where *D* is the region bounded by $y = x,\ y = x + 2,\ x + y = 2,\ x + y = 4$. Given the transformation $u = x - y,\ v = x + y$.

(3 points) a. Solve for *x* and *y* in terms of *u* and *v*.

(3 points) b. Transform the region *D* into the *uv*-plane using the equations found in part a.

(2 points) c. Determine the Jacobian, $\frac{\partial(x,y)}{\partial(u,v)}$.

(2 points) d. Rewrite the original integral in terms of *u* and *v*.