Question #1 Pick 1 questions, 0 pts per question

Question

(3 points) 1. Estimate $\int_R \int \left(x^2y^2 + 2y\right) dA$ 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

(5 points) 2. Find the volume under the parabolic cylinder $z = x^2$ above the region enclosed by the parabola $y = 6 - x^2$ and the line $y = x$ in the xy-plane.

Question #3 Pick 1 questions, 0 pts per question

Question

(5 points) 3. Find the average value of the function $f(x, y) = xy$ over the region bounded by the lines $x = 1$, $y = 1$, in the first quadrant.

Question #4 Pick 1 questions, 0 pts per question

Question

(6 points) 4. Use a double integral to find the volume of the solid region bounded above by the paraboloid $z = 9 - x^2 - y^2$ and below by the unit circle $x^2 + y^2 = 1$ in the xy-plane.

Question #5 Pick 1 questions, 0 pts per question

Question

(6 points) 5. Use a double integral to find the area inside one leaf of $r = 4 \sin 3\theta$.

Question #6 Pick 1 questions, 0 pts per question

Question

(5 points) 6. Find the area of the surface of the part of $3x + 2y + 4z = 5$ that lines in the first octant.

Question #7 Pick 1 questions, 0 pts per question

Question

7. Given the region D bounded by $y = x + 2$ and $y = x^2$. If the region has the density function $\rho(x, y) = kx^2$, determine the following:

(4 points) a. M_x

(4 points) b. M_y

(4 points) c. M

(2 points) d. The center of mass

Question #8 Pick 1 questions, 0 pts per question

Question

(6 points) 8. Use a triple integral to find the volume of the solid bounded by the paraboloids $z = 8 - x^2 - y^2$ and $z = x^2 + y^2$.

Question #9 Pick 1 questions, 0 pts per question

Question

(7 points) 9. Use cylindrical coordinates to evaluate $\int\int_E \int (x-y)dV$ where E is the solid that lies between the cylinders $x^2+y^2=1$ and $x^2+y^2=16$, above the xy-plane, and below the plane $z=y+4$.

Question #10 Pick 1 questions, 0 pts per question

Question

(7 points) 10. Use spherical coordinates to evaluate $\int\int_E \int (x^2+y^2)dV$ where E is the solid that lies between the spheres $x^2+y^2+z^2=4$ and $x^2+y^2+z^2=9$.

Question #11 Pick 1 questions, 0 pts per question

Question

11. Given the following integral: $\int_0^{\frac{2}{3}} \int_y^{2-2y} (x+2y)e^{(y-x)}dxdy$

(3 points) a. Using the substitutions $u=x+2y,\ v=x-y$, solve for x and y as functions of u and v.

(3 points) b. Transform the boundaries of the region D from the xy-plane to the uv-plane.

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

(3 points) d. Using the information found above, rewrite the integral in the uv-plane.