Name:____________________________

§13.3 Double Integrals in Polar Coordinates

1. Find the area of the region inside $r = 1$ and outside $r = 2 - 2\cos\theta$.

2. Use polar coordinates to evaluate the double integral $\displaystyle\iint_R \sqrt{x^2 + y^2 + 1}\, dA$, where R is the disk $x^2 + y^2 \leq 16$.

3. Use the most appropriate coordinate system to evaluate the double integral $\displaystyle\iint_R \cos\left(\sqrt{x^2 + y^2}\right)\, dA$, where R is the region bounded by $x^2 + y^2 = 9$.

4. Use an appropriate coordinate system to compute the volume of the solid below $z = 4 - x^2 - y^2$ and above $z = x^2 + y^2$, between $y = 0$ and $y = x$, in the first octant.

5. Evalute the iterated integral $\int_0^2 \int_y^{\sqrt{2y-y^2}} x\,dx\,dy$ by converting to polar coordinates.

6. Find the mass of a lamina in the shape of $x^2 + (y-1)^2 = 1$ with density $\rho(x, y) = \dfrac{1}{\sqrt{x^2 + y^2}}$.

§13.4 Triple Integrals

7. Evaluate the triple integral $\iiint_Q f(x, y, z)\, dV$, where $f(x, y, z) = x - y$ and Q is bounded by $z = x^2 + y^2$ and $z = 4$.

8. Compute the volume of the solid bounded by $z = x^2$, $z = x + 2$, $y + z = 5$, and $y = -1$.

9. Compute the volume of the solid bounded by $z = 5 - y^2$, $z = 6 - x$, $z = 6 + x$, and $z = 1$.

10. Find the mass of the solid bounded by $z = x^2 + y^2$ and $z = 4$ with density $\rho(x, y, z) = 2 + x$.

11. Sketch the solid whose volume is given by $\displaystyle\int_0^1 \int_0^{\sqrt{1-x^2}} \int_0^{\sqrt{1-x^2-y^2}} dz\, dy\, dx$. Rewrite the iterated integral using a different innermost variable.

12. Sketch the solid whose volume is given by $\displaystyle\int_0^2 \int_0^{\sqrt{4-z^2}} \int_{y^2+z^2}^{2} dx\, dy\, dz$. Rewrite the iterated integral using a different innermost variable.