

Math 2551-G Quiz 5

QUIZ KEY

You have 10 minutes to take the Quiz. You may not use aids of any kind.

Learning Targets

I1: Double & Triple Integrals. I can set up double and triple integrals as iterated integrals over any region. I can sketch regions based on a given iterated integral.

I2: Iterated Integrals. I can compute iterated integrals of two and three variable functions, including applying Fubini's Theorem to change the order of integration of an iterated integral.

Tasks

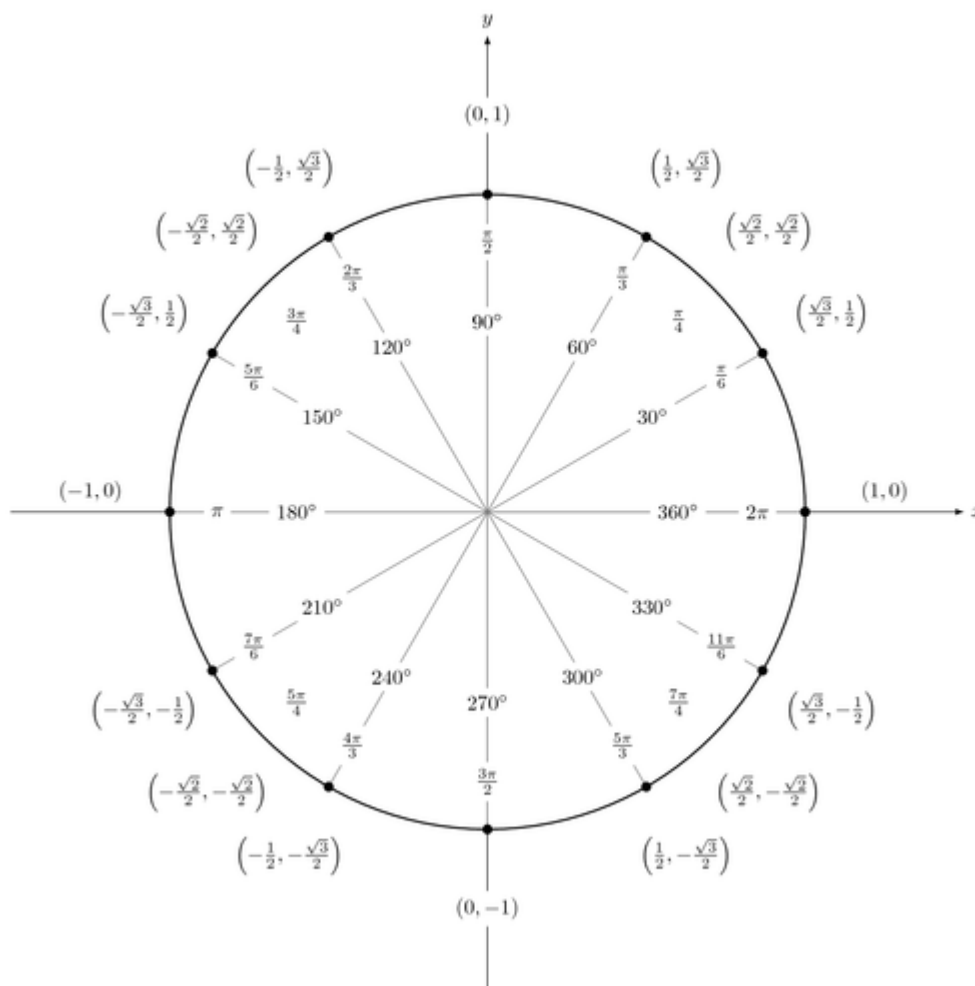
1. Find the volume of the solid under the surface $z = 2 \sin(y^2)$ over the triangular region bounded by

$$x = 0, \quad y = \sqrt{\pi}, \quad y = x.$$

Solution. This region is both vertically and horizontally simple. We will integrate horizontally to facilitate dealing with the y^2 in the cosine function. Thus, we have

$$\begin{aligned} \text{Volume} &= \int_0^{\sqrt{\pi}} \int_0^y 2 \sin(y^2) \, dx \, dy \\ &= \int_0^{\sqrt{\pi}} 2y \sin(y^2) \, dy \\ &= \int_0^{\pi} \sin(u) \, du \quad (u = y^2, du = 2y \, dy) \\ &= -\cos(u) \Big|_0^{\pi} \\ &= 2 \end{aligned}$$

Useful Formulas



- $\sin^2(x) = \frac{1 - \cos(2x)}{2}$
- $\cos^2(x) = \frac{1 + \cos(2x)}{2}$