Spring 2012 - P13

13. Find the volume of the solid generated by revolving the region bounded by the graphs of \( y = x^2 \) and \( y = 1 \) around the \( x \)-axis.

\[ \int_0^1 (1 - x^2) \, dx \]

A) \( \frac{8}{5} \pi \) B) \( \frac{1}{5} \pi^2 \) C) \( \frac{4}{5} \pi \) D) \( 2 \pi \) E) \( \frac{14}{15} \pi \) F) \( \frac{16}{5} \pi \)

Fall 2012 - P3

3. The region of the \( xy \)-plane bounded by \( y = (x - 1)^\frac{1}{2} \) and the \( x \)-axis for \( 1 \leq x \leq 2 \) is rotated about the \( x \)-axis. The volume of the resulting solid of revolution is:

(a) \( \frac{2}{3} \pi \) (b) \( \frac{1}{2} \pi \) (c) \( \frac{3}{2} \) (d) \( 2 \pi \) (e) \( \frac{5}{3} \) (f) \( 4 \)

Spring 2011 - P2

2. A pyramid with a square base lies on the \( x,y \)-plane, with the vertices of its base at the points \((1,1),(1,-1),(-1,1),(-1,-1)\). The height of the pyramid is 2, and the vertex of the pyramid lies directly over the origin of the \( x,y \)-plane. What is the volume of the pyramid?

(a) 2 (b) 3 (c) 5/2 (d) 8/3 (e) 11/4 (f) 18/5

Fall 2010 - P3

3. Find the volume of the solid obtained by rotating the region bounded by the \( x \)-axis, the line \( y = 1 \), the curve \( y = \ln(x) \), and the line \( x = 1/2 \) about the \( y \)-axis.

(A) \( \pi(e - 2) \) (B) \( 2\pi \left( \frac{e^2}{4} - \frac{3}{4} \right) \) (C) \( 2\pi \left( \frac{e^2}{4} + \frac{3}{4} \right) \) (D) \( \pi \left( \frac{1}{2}e^2 - \frac{3}{4} \right) \)

(E) \( \frac{\pi}{8}(4e^2 - 3 - 2\ln 2) \) (F) \( \pi \left( e - \frac{3}{2} \right) \) (G) \( \frac{e\pi}{2} \) (H) \( \pi \left( \frac{3}{4} + \frac{e^2}{2} - e \right) \)
The base of a solid is a semi-circular disk \( \{ (x, y) \mid x^2 + y^2 \leq 1, x \geq 0 \} \). Cross sections perpendicular to the \( x \)-axis are squares with their vertices on the semi-circle. Compute the volume of the solid.

\[
\begin{align*}
\text{a)} & \quad \frac{8}{3} \\
\text{b)} & \quad \pi^2 \\
\text{c)} & \quad \frac{2\pi}{3} \\
\text{d)} & \quad \frac{\pi^2}{4} \\
\text{e)} & \quad 1 \\
\text{f)} & \quad 4
\end{align*}
\]

Fall 2008 - P2

The volume of the solid generated by revolving the region bounded by the curves \( x = y^2 \) and \( y = x - 2 \) about the \( y \)-axis

\[
\begin{align*}
\text{a)} & \quad \frac{20\pi}{3} \\
\text{b)} & \quad \frac{72\pi}{5} \\
\text{c)} & \quad \frac{42\pi}{5} \\
\text{d)} & \quad \frac{13\pi}{2} \\
\text{e)} & \quad \frac{32\pi}{5} \\
\text{f)} & \quad \frac{212\pi}{15}
\end{align*}
\]