

Quiz 7 will cover the following material: (all handouts posted on the web site so far)

1. All material for Quizzes 1-6 and Exam 1
2. Computing volumes using cross sections, the disk method and the washer method.

Sample Quiz 7

1. Compute the average value of $f(x) = xe^{-2x}$ on the interval $[-2, 2]$.
2. a) A wedge is cut out of a circular cylinder of radius 8 units by two planes. One plane is perpendicular to the axis of the cylinder. The other intersects the first at an angle of 60° along a diameter of the cylinder. Compute the volume of the wedge.
b) Redo part a) but this time the radius is R and the angle is α
3. Let R be the region determined by the graphs of $y = x^2$, $y = 4x$ and $y = 4$. Compute the volume of the object we obtain when we rotate R about
a) the x -axis b) the y -axis
4. Approximate the integral $\int_0^1 \sqrt{x^4 + 1} dx$ using Simpsons rule with $n = 8$.

Answers

1. $\frac{1}{4} \int_{-2}^2 xe^{-2x} dx = -\frac{5}{16}e^{-4} - \frac{3}{16}e^4 \approx -10.24287677$
2. a) $\int_{-8}^8 \frac{\sqrt{3}}{2} (\sqrt{64 - x^2})^2 dx = \frac{1024}{3}\sqrt{3}$ b) $\int_{-R}^R \frac{1}{2} (\sqrt{R^2 - x^2})^2 (\tan \alpha) dx = \frac{2}{3}R^3 \tan \alpha$
3. a) $\int_0^1 \pi ((4x)^2 - (x^2)^2) dx + \int_1^2 \pi (4^2 - (x^2)^2) dx = \frac{77}{15}\pi + \frac{49}{5}\pi = \frac{224}{15}\pi$
b) $\int_0^4 \pi \left((\sqrt{y})^2 - \left(\frac{y}{4}\right)^2 \right) dy = \frac{20}{3}\pi$
4. 1.08942929898502