Quiz 6 will cover the following material: (all handouts posted on the web site so far)

1. All material for Quizzes 1-5 and Exam 1
2. Applying definite integrals to area under the graph, area between two graphs. Computing the average value of an integrable function.
3. Computing volumes using cross sections and the disk method.

Sample Quiz 6

1. Find the area between the graphs of $f(x) = \sqrt{x-2}$ and $g(x) = \frac{1}{2}x - 1$.
2. Compute the average value of $f(x) = xe^{-2x}$ on the interval $[-2, 2]$.
3. a) Graph $\cosh x$ and then use your graph to sketch the graph of $\dfrac{1}{\cosh x}$.

   b) Compute the integral $\displaystyle\int \frac{1}{\cosh x}dx$.

   c) Compute the improper integral $\displaystyle\int_0^\infty \frac{1}{\cosh x}dx$.
4. Compute the volume of the solid with a circular base with radius r if cross sections perpendicular to the base are

   a) isosceles right triangles with the hypotenuse lying on the base.

   b) isosceles right triangles with the shorter side on the base.
5. A pyramid has height H and a base that is a rectangle with sides a and b. Set up an integral expressing the volume of this pyramid and evaluate it.
6. 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
7. a) Let R be the region determined by the graphs of $y = x^3$, $y = 0$ and $x = 2$. Compute the volume of the object we obtain when we rotate R about the $x-$axis.

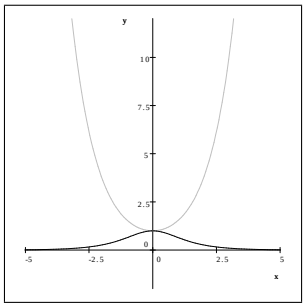
   b) Let R be the region determined by the graphs of $y = x^3$, $x = 0$ and $y = 8$. Compute the volume of the object we obtain when we rotate R about the $y-$axis.
8. Approximate the integral $\displaystyle\int_0^1 \sqrt{x^4+1}dx$ using Simpsons rule with $n = 8$.

Answers

1. $\dfrac{4}{3}$

2. $\dfrac{1}{4}\displaystyle\int_{-2}^{2} xe^{-2x}dx = -\frac{5}{16}e^{-4} - \frac{3}{16}e^{4} \approx -10.\,242\,876\,77$

3. a) b) $2\arctan(e^x) + C$ c) $\dfrac{\pi}{2}$



4. a) $\dfrac{4}{3}r^3$ b) $\dfrac{8}{3}r^3$

5. $V = \displaystyle\int_0^H \left(a\frac{x}{H}\right)\left(b\frac{x}{H}\right)dx = \frac{1}{3}Hab$

6. a) $\displaystyle\int_{-8}^{8} \frac{\sqrt{3}}{2}\left(\sqrt{64-x^2}\right)^2 dx = \frac{1024}{3}\sqrt{3}$ b) $\displaystyle\int_{-R}^{R} \frac{1}{2}\left(\sqrt{R^2-x^2}\right)^2 (\tan\alpha)\,dx = \frac{2}{3}R^3\tan\alpha$

7. a) $\dfrac{128}{7}\pi$ b) $\dfrac{96}{5}\pi$

8. $1.\,089\,4293$

