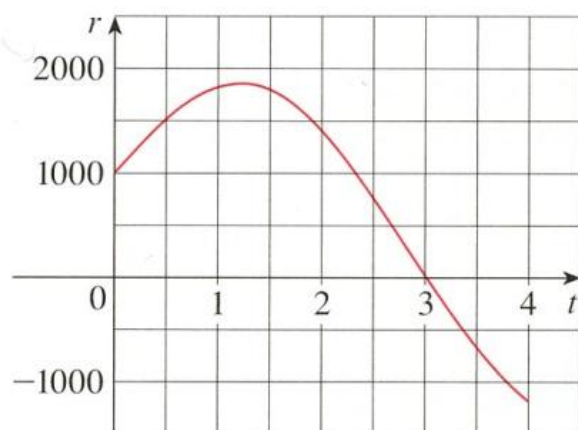


Math 205: Assignment #1

Date Due: January 16, 2015

Please show your work! Even if you think the question was trivial work still must be shown. Partial marks will be awarded where warranted.

1. Evaluate the integral $\int \frac{\sin 2x}{\sin x} dx$ (3 marks)
2. Evaluate the integral $\int \frac{x}{x^2+1} dx$ (3 marks)
3. Evaluate the integral $\int \frac{x^2}{\sqrt{1-x}} dx$ (4 marks)
4. Sketch the graph of $|\sin x|$ over the region from $x = 0$ to $x = 3\pi/2$ and find the area between the graph and the x-axis (4 marks)
5. Water flows in and out of a storage tank at a rate $r(t)$. The graph below shows $r(t)$ plotted against time. The units for $r(t)$ are L/day and the units for the t-axis are in days. If the amount of water in the tank at $t = 0$ was 25,000 L estimate the amount of water in the tank after 4 days.



Be sure to explain how you arrived at your final answer! (6 marks)

6. A colony of honey bees has a population of 5000 on April 1. At this point the queen begins to lay and the hive population increases according to the function
$$r(t) = \frac{18}{1+(t-12)^2}$$
where the units are thousands of bees per week.
 - a. Sketch the rate of growth over the next 20 weeks – when does the hive have its maximum rate of growth? When – in this interval is the hive population maximum? (4 marks)
 - b. Use integral tables to calculate the hive population in mid-July (16 weeks later) (6 marks)