CALCULUS II (Math 150B): Practice Midterm II.

1. Suppose that Alice computed the **Left**, **Right**, **Trapezoidal**, and **Midpoint** approximations with 10 partitions to $\int_0^1 f(x)dx$, where $f(x)$ is as shown below. She wrote them on cards, but forgot to label which one is which. Here are the values of the approximations in increasing order.

   i 0.33575

   ii 0.36735

   iii 0.36814

   iv 0.39896

   (a) USING THE GRAPH, indicate for each approximation whether it is an **over** or an **under** estimate and decide which of the above values goes with which approximation?

Left	=		estimate	=
Right	=		estimate	=
Midpoint	=		estimate	=
Trapezoid	=		estimate	=

2. Let R be the region in the first quadrant between the curves $y = \sqrt{x}$ and $y = \frac{1}{2}x$.

   (a) Express as an integral the volume of the solid generated by revolving the region R about the x-axis. (DO NOT COMPUTE!)

   (b) Still letting R be the region between the curves $y = \sqrt{x}$ and $y = \frac{1}{2}x$, express as an integral the volume of the solid generated by revolving the region R about the line $x = -1$. (DO NOT COMPUTE!)

3. Three hours ago, a thin strip of nutrients 10 cm long is placed along the base of a triangular dish of base $10cm$ and height $5cm$. Now, the population density of bacteria

in the disk is given by $\frac{80}{x+4}$ bacteria/cm^2 where x is the distance (in cm) to the nutrient strip.

(a) How do you break up the region into "slices" that have constant density?

(b) What is the bacteria population on a typical slice?

(c) Write an integral that gives the total number of bacteria now in the dish.(DO NOT COMPUTE!)

4. Set up (but DO NOT COMPUTE!) a definite integral giving the total force due to water pressure on a dam that is 100 meters tall and is shaped like an semi-circle with radius 100 meters. Recall that the density of water is 1000 $\frac{\text{kg}}{\text{m}^3}$ or $62.4\frac{\text{lb}}{\text{ft}^3}$, that the gravitational constant on earth is $9.8\frac{\text{m}}{\text{s}^2}$.

5. Set up (but DO NOT COMPUTE!) a definite integral giving the area of the region in the first quadrant contained by the curve $r = 1 + sin\theta$.