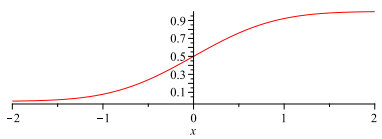


**MATH 134**  
**Second Hour Exam Sample**  
April 3, 2011

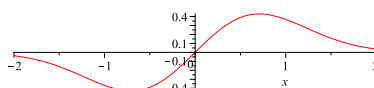
You may use your calculator and integral tables. Indicate any calculations you do with the calculator, indicate which formula you use from the tables and the values of any constants that appear in the formula, and show your algebra whenever calculations are done by hand.

1. (20 pts.) Short answer questions:

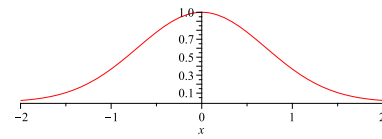
- (a) Of the following three graphs, which could be the graph of a probability density function, which could be the graph of a cumulative distribution function, which is neither? Briefly explain your choices.



(a)



(b)



(c)

Figure 1:

(b) Suppose that  $y = f(x)$  and  $y = g(x)$  satisfy  $f(x) \geq g(x) \geq 0$  on  $1 \leq x \leq \infty$ . Which of the following is true? Explain briefly.

- i. If  $\int_1^\infty f(x) dx$  converges then  $\int_1^\infty g(x) dx$  converges.
- ii. If  $\int_1^\infty g(x) dx$  converges then  $\int_1^\infty f(x) dx$  converges.

2. (20 pts.) The region  $A$  in the plane is shown in Figure 4. It lies between the graphs of  $x = -y^2 - 1$ ,  $y = x$ , and  $y = 0$  and  $y = 1$ .

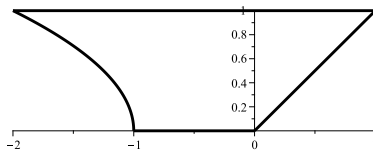


Figure 2:

- Label the coordinates of the corners of  $A$  on the plot.
- Compute the area of  $A$ .

3. (20 pts.) The region  $A$  in the plane is defined by the following inequalities:

$$0 \leq x \leq y^2, \quad \text{and} \quad -1 \leq y \leq 1.$$

- (a) Sketch the region  $A$ .
- (b) Sketch the solid of revolution obtained by rotating the region about the line  $x = 2$ .
- (c) Find the volume of the region from part (b).

4. (20 pts.) Consider the triangle with vertices  $(0, 0)$ ,  $(4, 2)$ , and  $(4, 0)$ . Find the coordinates of the center of mass of the triangle.

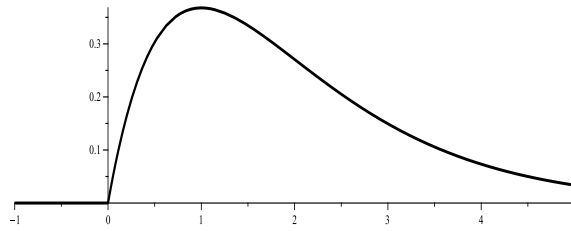


Figure 3:

5. (20 pts.) The above figure shows the graph of the function

$$f(x) = \begin{cases} 0 & x < 0 \\ xe^{-x} & x \geq 0 \end{cases}$$

- Show that  $f(x)$  is a probability density function.
- Find the mean of the density function  $f$ .
- Is the median of  $f$  larger than the mean or is the mean larger than the median? Explain your answer. (*Hint:* This question can be answered based on the shape of the density and WITHOUT calculations.)