

## Quiz #8

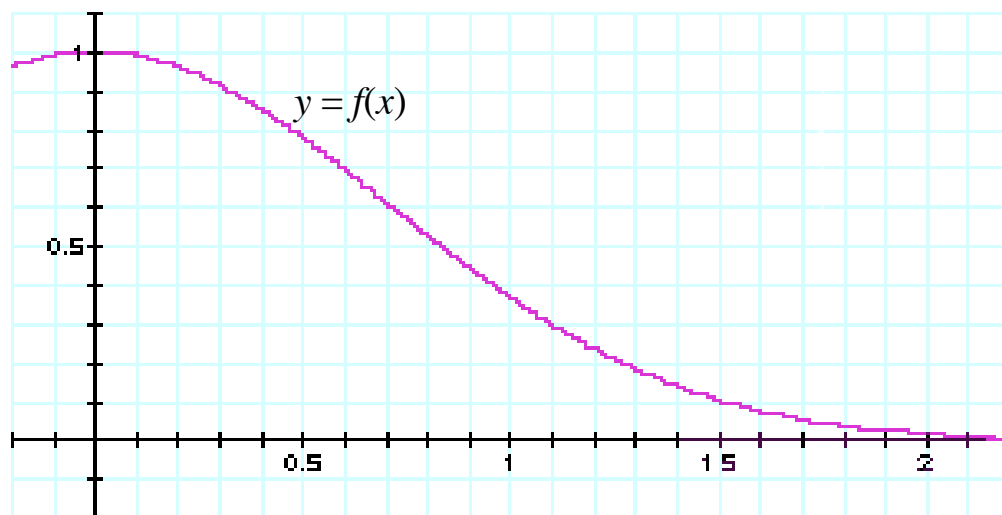
1. In this problem, the function  $f(x)$  will always refer to the function defined by the equation:

$$f(x) = e^{-x^2}.$$

- (a) **(1 point)** Use derivatives to determine whether or not the function:  
is an anti-derivative of  $f(x)$  or not. Be sure to show all of your work.

$$F(x) = \frac{e^{-x^2+1}}{-x^2+1} + C$$

- (b) **(2 points)** The graph shown below is a graph of  $y = f(x)$ . Suppose that you were asked to approximate the area under the graph of  $y = f(x)$  between  $x = 0$  and  $x = 2$  using five (5) rectangles. Use the graph provided below to sketch the five rectangles that you would use.



*Continued on the next page*

- (c) **(2 points)** Table 1 (below) lists the values of  $f(x)$  at several different  $x$ -values. Use the entries in Table 1 to approximate the area beneath  $y = f(x)$  between  $x = 0$  and  $x = 2$  using five (5) rectangles.

$x$	$f(x)$	$x$	$f(x)$
0	1	1.2	0.23693
0.2	0.96079	1.4	0.14086
0.4	0.85214	1.6	0.0773
0.6	0.69768	1.8	0.03916
0.8	0.52729	2.0	0.01832
1.0	0.36788		

Table 1: Selected values of the function  $f(x)$ .

You may not need to use all of the numbers from Table 1. Use only those that you actually need. Clearly indicate your final answer and include at least four (4) decimal places with your answer.

- (d) **(1 point)** Is the estimate that you calculated in Part (d) an under-estimate or an over-estimate of the “true value” of the area beneath  $y = f(x)$  from  $x = 0$  to  $x = 2$ ? In a sentence or two, briefly explain how you know.

2. (4 points) Use **Newton's method** to find the solution of the equation:

$$\cos(x) = x.$$

correct to eight (8) decimal places. In order to get credit, you must show your work.

You should not use your calculator on this problem for anything except simple arithmetic, and evaluating trigonometric functions. In particular, you should not solve the equation by tracing the graph of a function or finding intersection points on your calculator.

If you use your calculator, make sure it is set in RADIAN mode. Clearly indicate your final answer and include at least eight (8) decimal places.

*Additional space for your work is provided on the next page.*