

No books or notes allowed. Show all of your work and **put a box around your answers.**
Missing work will earn no points.

1 [12 points]

(a) Find the linearization $L(x)$ of the function $f(x) = \sin(x+5)$ at the point $x=0$. (In other words, the book would say $a=0$.) Give three decimal places of accuracy after the decimal point for any approximate numbers in the $L(x)$ formula.

Answer: $L(x) =$

(b) Use the linearization you found in (a) to approximate the value of $\sin(5.03)$. Show your work clearly and give three decimal places of accuracy after the decimal point.

Answer: Using the linear approx., $\sin(5.03) \approx$

CAUTION: BE SURE YOUR CALCULATOR IS IN RADIANS MODE FOR (a) AND (b).

2 [8 points] We can use Newton's method to approximately find the largest solution of $\ln(x) + 5 = 2x$. Using the notation of the book, if we use an initial guess of $x_0 = 4$ then the next two approximate solutions (x_1 and x_2) are:

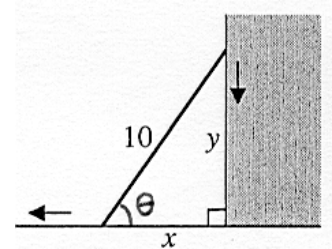
(Show some work here if you want consideration for partial credit)

$$x_1 = \underline{\hspace{4cm}}$$

$$x_2 = \underline{\hspace{4cm}}$$

(Give 3 places after the decimal point.)

3 [4 bonus points] A 10-foot ladder leans against the side of a building. If the bottom of the ladder is pulled away from the wall at 3 feet per second, but the ladder remains in contact with the wall, find the rate at which the angle θ that the ladder makes with the floor is changing when the bottom is 8 feet from the wall. Give your answer with at least 3 places after the decimal point, and include units. You must show your work clearly, and there is no partial credit...you must get the right answer to receive any credit.



Answer: The rate at which the angle θ is changing when the bottom is 8 feet from the wall is _____ (units)