

Homework: Sections 4.5 and 4.7 and 4.9 Due: Tuesday, November 15

- I. Do Section 4.7 #24 and #28.
- II. Do Section 4.5 #36.
- III. (30 points) In this exercise, you will do Section 4.9 #14, following the instructions below. This problem is about $f(x) = x^4 + x - 4$.
 - a. Read the paragraph on page 348 that begins with “The geometry behind Newton’s Method...”
 - b. Find the formula for the tangent line of the function $f(x) = x^4 + x - 4$ at the point $x = 3$. Find the x -intercept of this line. Show your work, and explain what you are doing. (Say things like, “The slope of the line is...” and “The point we will use in the point/slope formula for our line is...” and “To find the x -intercept, we...”)
 - c. Write the general formula from Newton’s method for calculating x_{n+1} , in terms of x_n . (Write something like, “If x_n is the n th approximation of the root of f , then the formula for the $n + 1$ st approximation is given by...”) Now put your function f and your derivative f' into the formula to get a formula for the $n + 1$ st approximation in this particular problem.
 - d. Starting with $x_1 = 3$, calculate x_2 using this formula, and your function f . You should get the same answer as in part (a).
 - e. Calculate x_2 , x_3 and x_4 .
 - f. On the graph provided here, draw the tangent lines at each successive approximation of the root, to demonstrate that you understand how Newton’s Method works. Label x_1 , x_2 , x_3 and x_4 on the graph. Make sure what you draw matches your answers above.
 - g. If x_4 were a really good approximation of the root of f , what do you expect $f(x_4)$ to equal? (Write “If x_4 were a really good approximation, I would expect...”) What is $f(x_4)$ in this case?

