

HW 15: Section 3.1

Due: Thursday, October 31st in SQRC by 9pm

Learning Goals:

- Find equations of tangents lines to a graph.
- Use linear approximations of a function to approximate values of the function.
- Use a linear approximation of data to approximate the value of a function.
- Use Newtons method to approximate the value of zeros of a function.

Questions:

1. Problem 3.1.2 Find an approximation of $(1.2)^{\frac{1}{3}}$ by using a linear approximation to $(1+x)^{1/3}$ at $x = 1$.
2. Problem 3.1.4 Find an approximation of $2/0.99$ by using a linear approximation to $2/x$ at $x = 1$.
3. Problem 3.1.8 Use a linear approximation to approximate $\sin(0.1)$, $\sin(1)$ and $\sin(9/4)$. Hint: Choose an approximation point x_0 that is near to the value we are approximating at and so that we know $\sin(x_0)$ exactly.
4. Problem 3.1.12 Use the table of values to approximate $f(8)$ and $f(12)$:

t	5	10	15
f(t)	8	14	18
5. Problem 3.1.14 Use Newtons method starting at $x_0 = -1$ to approximate solutions to $x^3 + 4x^2 - x - 1 = 0$. Compute at least the first two steps of the algorithm to find x_1 and x_2 .
6. Problem 3.1.20 Use Newtons method to find an approximate root of $\cos(x) - x = 0$. Sketch the graph and explain how you determined your initial guess.
7. Problem 3.1.28 Use Newtons method to estimate the value of $23^{1/3}$. Hint: Think about the equation $x^3 = 23$.