

# M/CS 375 HW 3

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January 29, 2023

## 1.1.4

Find an approximate root within 1/8th of the true root for

$$\begin{aligned} \sin(x) &= 6x + 5 \\ f(x) &= \sin(x) - 6x - 5 \end{aligned}$$

1. Calculate the max distance between  $a$  and  $b$

$$\begin{aligned} \frac{b-a}{2^{n+1}} &< \frac{1}{8} \\ \frac{b-a}{2^3} &< \frac{1}{8} \\ \frac{b-a}{8} &< \frac{1}{8} \\ b-a &< 1 \end{aligned}$$

2. Let's set  $a = -1, b = 0$

3. Check if bisection can be done:

$$\begin{aligned} f(a) &= \sin(-1) - 6(-1) - 5 \\ f(a) &> 0 \\ f(b) &= \sin(0) - 6(0) - 5 \\ f(b) &< 0 \\ f(a) \cdot f(b) &< 0 \checkmark \end{aligned}$$

4. Step through bisection twice

Steps	$a$	$b$	$c$	$f(c)$
0	-1	0	-0.5	-2.48
1	-1	-0.5	-0.75	-1.18
2	-1	-0.75	-0.875	-0.52

5. The approximate root is  $x \approx -0.875$