UNIT 20: WORKSHEET

The intermediate value theorem

Problem 1: Today, the average temperature is 48° Fahrenheit. Yesterday, it had been 58°. Is it true that there was a moment last night, where the temperature had been exactly 50 degree Fahrenheit.

Problem 2: Argue why there was a time in your life whether you were 1000 times longer than your average teeth length.

Problem 3: How would you find a root of the function $f(x) = \cos(x) - x$ using a calculator and without taking derivatives.

Problem 4: Is there a point x, where

$$\frac{1}{\sin(x)} = \frac{1}{2} \ ?$$

We have $1/\sin(\pi/2) = 1$ and $1/\sin(3\pi/2) = -1$.

Problem 5: The earth's diameter is 12'756 km in average. Is there a point on earth where the distance to its anti-pod is exactly 12'756 km?

Problem 6: The function $g(x) = x - \text{floor}(x)$ is a **ground hog function**. If you know the movie with **Bill Murray**, you know why. We know $g(0.9) = 0.9$ and $g(1.1) = 0.1$. Can you conclude that there is a point between 0.9 and 1.1 where $g(x) = 0.5$? What does the intermediate value theorem tells here?

Feb 2   Feb 2   Feb 2