Section 4.2

Polynomial:
\[ f(x) = a_n x^n + a_{n-1} x^{n-1} + \ldots + a_0 \]

- Degree = largest exponent
- Graph = smooth curves, continuous over \( \mathbb{R} \)

Turning points: pts where graph goes from dec/inc or inc/dec

- Linear: \( a > 0 \) \( \Rightarrow \) 0 turning pts \( y = ax + b \) \( \text{deg} = 1 \)
- Quadratic: \( a > 0 \) \( \Rightarrow \) 1 turning pt
- Cubic: \( a > 0 \) \( \Rightarrow \) up to 2 turning pts
- Quartic: \( a > 0 \) \( \Rightarrow \) up to 3 turning pts
- Quintic: \( a > 0 \) \( \Rightarrow \) up to 4 turning pts

#2 (2, 65)
After 2 sec, the max height of the stone is 65 ft.

Extrema

Relative extrema: Rel max/rel min. (local) \( (x,y) \) find these at turning pt

Absolute extrema: Absolute max/min (global) \( (x,y) \)

End behavior: What happens to \( y \) values as \( x \) gets Really Big or Really Small.

- Degree even: \( a > 0 \), as \( x \) gets big or small, \( y \) gets Big
- \( a < 0 \), as \( x \) gets big or small, \( y \) gets small

#39
\[ f(x) = -x^3 + 8x \]

Graph rises from left to right

Graph falls from left to right