Problem Set 1.1 : Introducing Derivatives

18.01 OCW Discord

2nd October, 2021

1 Continuity of Functions And Limits

1. Find the points of discontinuity of the following functions:

- $\dfrac{x}{x^2+1}$
- $\dfrac{1}{\sqrt{x}}$

2. Evaluate the following limits:

- $\lim\limits_{x\to 0} \dfrac{\sin x}{3\sqrt{x}}$
- $\lim\limits_{x\to 0} \dfrac{3x^2+\sin x}{x}$

2 Derivatives

3. Show that the curve $y = 6x^2 + 5x - 3$ has no tangent line with slope 4.

4. Differentiate the following functions:

- $f(t) = \sqrt{t} - \dfrac{1}{\sqrt{t}}$
- $y = \dfrac{x^2 - 2\sqrt{x}}{x}$
- $y = \sqrt{x}(x-1)$