Math 1a Name: Cole Gannon

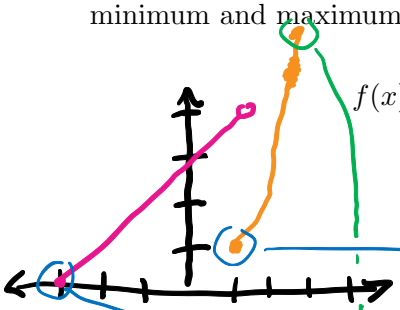
Section 4.1

---

1. Sketch the graph by hand. Use your graph to find the local and absolute minimum and maximum values. Answer DNE if any do not exist.

$$f(x) = \begin{cases} x+3 & : -3 \le x < 1 \\ x^2 & : 1 \le x \le 3 \end{cases}$$

range is $[0, 9]$



for locals, +

Local Maximum: DNE

Local Minimum: 1

Absolute Maximum: 9

Absolute Minimum: 0

2. Find the critical numbers of

$$f(x) = \frac{x-1}{x^2-x+1}$$

$f'(x) = \dfrac{(x^2-x+1) - (x-1)(2x-1)}{(x^2-x+1)(x^2-x+1)}$

$= \dfrac{x^2-x+1-(2x^2-3x+1)}{(x^2-x+1)^2} = \dfrac{-x^2+2x}{(x^2-x+1)^2} = 0$

critical values

$x = 0, 2 \quad y = -1, 1/3$

find value of x where $2x - x^2$ is zero but $(x^2-x+1)^2$ is not zero

$(0^2-0+1)^2 \neq 0$

$(2^2-2+1)^2 \neq 0$

$(4-2+1)^2 \neq 0$

$x = \dfrac{-2 \pm \sqrt{4-(4)(-1)(0)}}{-2}$

$x = \dfrac{-2 \pm 2}{-2}$

$x = 1 \pm 1$

$x = \{0, 2\}$

3. Find the absolute maximum and minimum values of $f(x) = x^3 - 6x^2 + 5$ on the interval $[-3, 5]$.

$f'(x) = 3x^2 - 12x$

$a = 3 \quad b = -12 \quad c = 0$

$x = \dfrac{12 \pm \sqrt{144-(4)(3)(0)}}{6} = \dfrac{12 \pm \sqrt{144}}{6} = \dfrac{12 \pm 12}{6}$

$x = 2 \pm 2$

$x = 0, 4$ in this case, x is the place where the slope is zero.

$f(0) = 5$ local & absolute max

$f(4) = 4^3 - 6(4)^2 + 5 = -27$ local min

$f(-3) = -76$ absolute min

$f(5) = -20$ nothing