3. Function Properties

Asymptotics and Trends

4.0/4.0 points (graded)

For each of the following functions $f(x)$ below :

- Find its limits $\lim_{x \to \pm\infty} f(x)$ as x approachs $\pm\infty$.
- Choose the values of x where $f(x)$ is differentiable, i.e. $f'(x)$ exists
- Choose the values of x where $f(x)$ is also strictly increasing, i.e. $f'(x) > 0$.

1. For $f(x) = \max(0, x)$:

   (If the limit diverges to infty, enter **inf** for ∞, and **-inf** for $-\infty$)

   $\lim_{x \to -\infty} f(x) =$ 0

   ✔ **Answer:** 0

   0

$\lim_{x \to +\infty} f(x) =$ inf ✔ **Answer:** inf

inf

Choose the intervals of x where

$f(x)$ differentiable: $f'(x) > 0$:

(Choose all that apply.)

- [x] $x < 0$
- [ ] $x < 0$
- [ ] $x = 0$
- [ ] $x = 0$
- [x] $x > 0$
- [x] $x > 0$

✔ ✔

(Graph this function on a piece of paper!)

2. For $f(x) = \dfrac{1}{1 + e^{-x}}$:

(Enter **inf** for ∞ and similarly **-inf** for $-\infty$ if the limit diverges to infty.)

$\lim_{x \to -\infty} f(x) =$ 0 ✔ **Answer:** 0

0

$\lim_{x \to +\infty} f(x) =$ 1 ✔ **Answer:** 1

1

Choose the intervals of x where

$f(x)$ differentiable: $f'(x) > 0$:

(Choose all that apply.)

☑ $x < 0$	☑ $x < 0$
☑ $x = 0$	☑ $x = 0$
☑ $x > 0$	☑ $x > 0$
✔	✔

(Graph this function on a piece of paper!)

Solution:

See answers above.
Remark: The function $f(x) = \max(0, x)$ is also called the a **linear rectifier** and the **Sigmoid** function, and will be revisited in *Unit 3 Neural networks* as activation functions within neural networks.

Submit You have used 1 of 3 attempts

Answers are displayed within the problem

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[TA] What is the difference between the Choice "X>0" and "X>0"? [TA] What is the difference between the Choice "X>0" and "X>0"?	3
BUG ? Question 1 part 2 During part 2 of question 1 where I must indicate the interval of x. I chose the right column o...	3
Problem 2 I used 1 out of 3 submissions when there was the bug, and it wouldn't let me resubmit.	9
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differentiable and strictly increasing A function which is differentiable and strictly increasing is not necessarily has positive derivat...	3
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Clarifications on the question. 1. So, is F(x) undefined at x = 0? also in the second part for the same question You want us to ...	2
Question 1 Derivate I got first question right but I am not sure the answer is correct, are there going to be answer...	2

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