Concavity

Concavity and Rates of change. (Section 2.6)

Example

t	0	10	20	30	40
S	40	72	128	230	411

Determine the concavity from a table.

← increasing function.
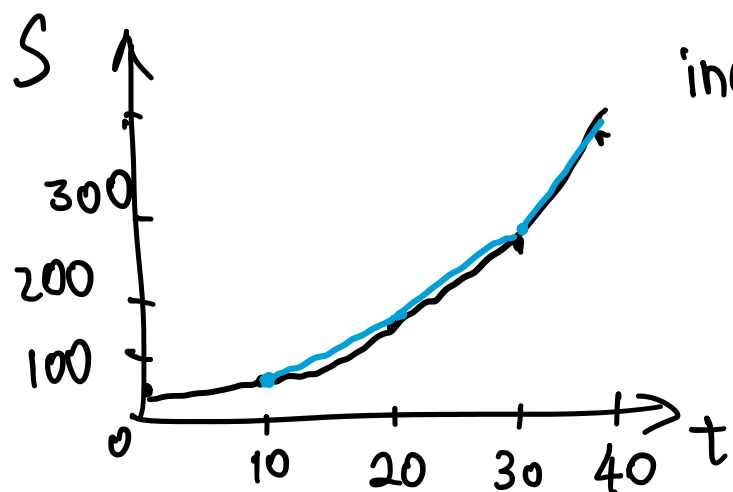
Rates of change

$\dfrac{\Delta S}{\Delta t}$

$\dfrac{72-40}{10-0} = 3.2$ $\dfrac{128-72}{20-10} = 5.6$ $\dfrac{230-128}{30-20} = 10.2$

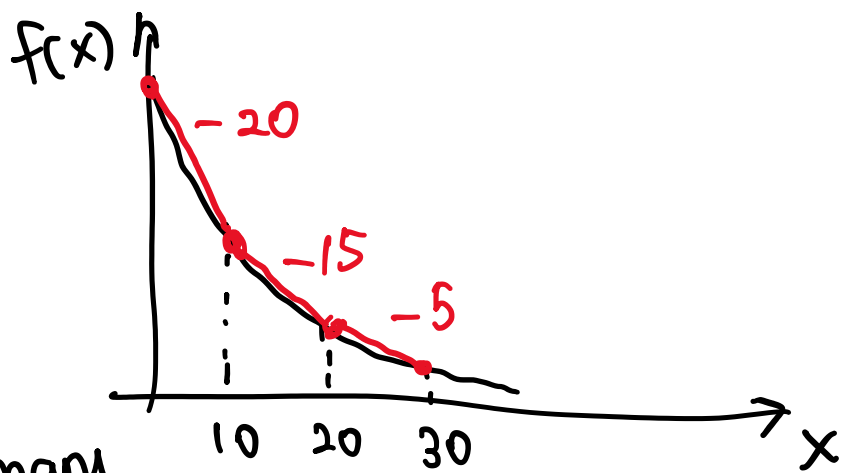To find the concavity we compute the rates of change.

The rate of change is increasing, thus the function is concave up.
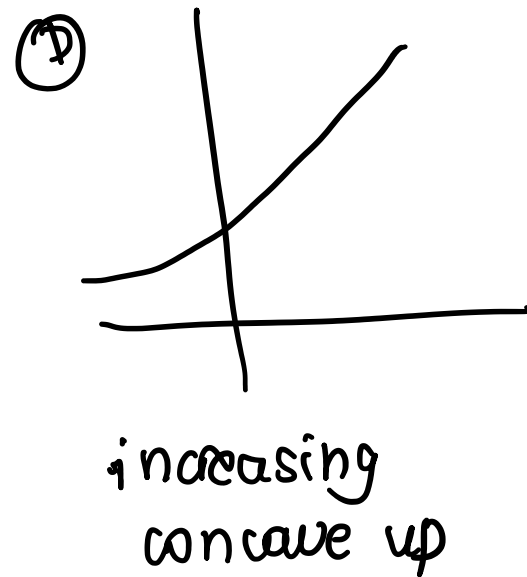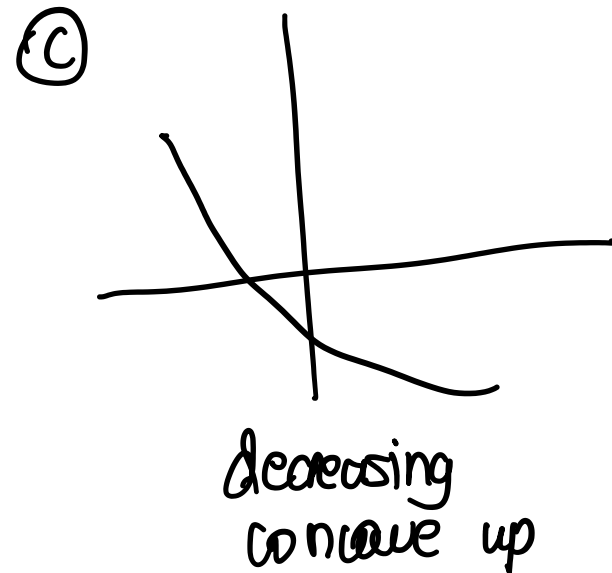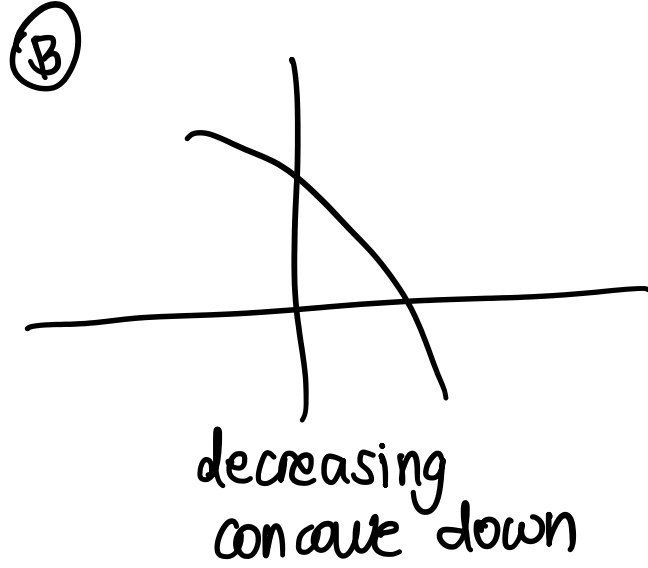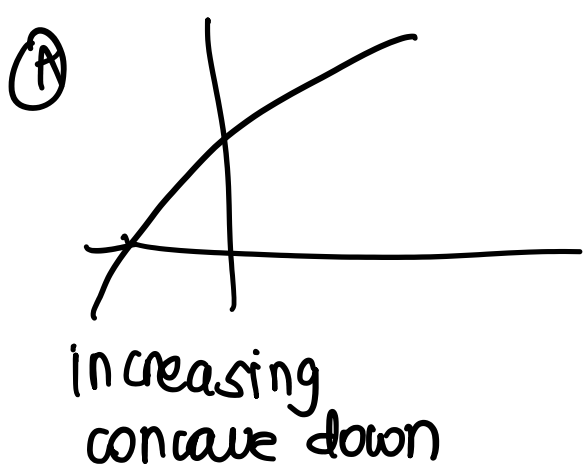
S increasing and concave up

Example   A function can be decreasing and still concave up.

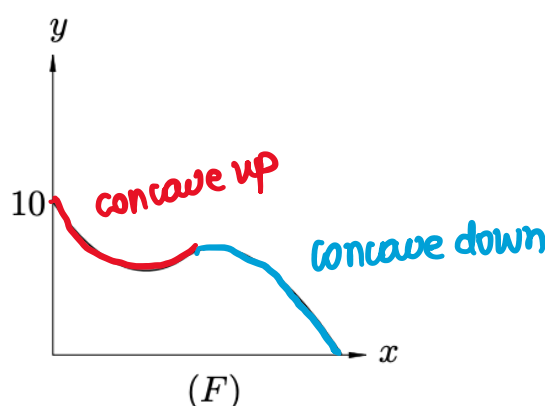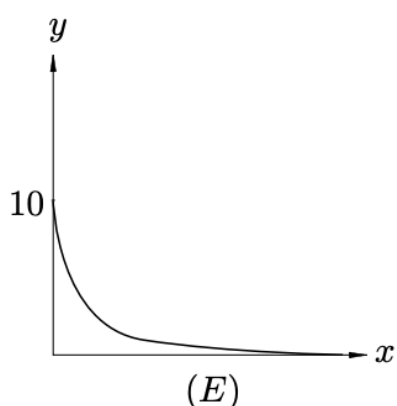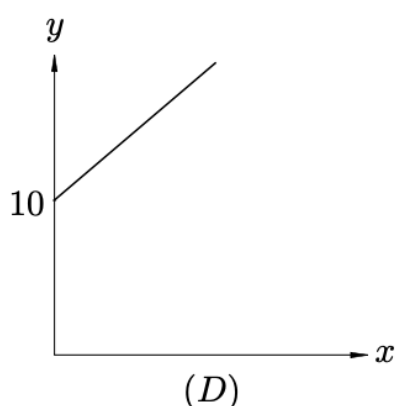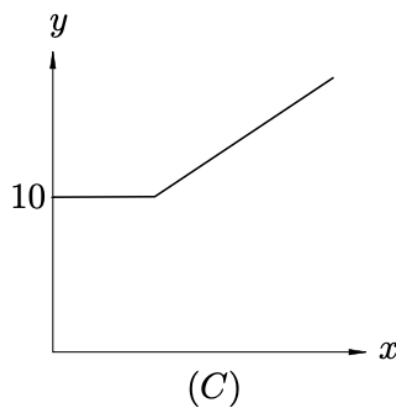The average rate of change is negative but it's increasing so the function is concave up.

Summary

(A) increasing concave down

(B) decreasing concave down

(C) decreasing concave up

(D) increasing concave up

concave up   concave down.

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1. [12 points] Use the graphs to answer the questions below.

(A)   (B)   (C)

(D)   (E)   (F) concave up / concave down
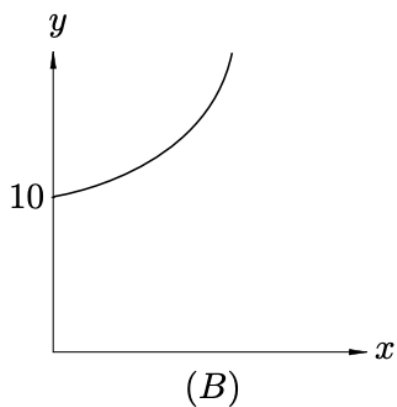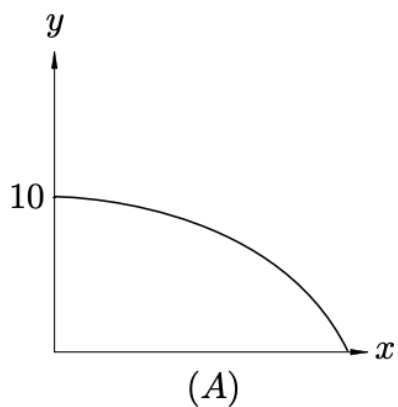
a. [2 points] Which of the graphs above are concave down?

(A)

Note: A constant or linear function has no concavity.