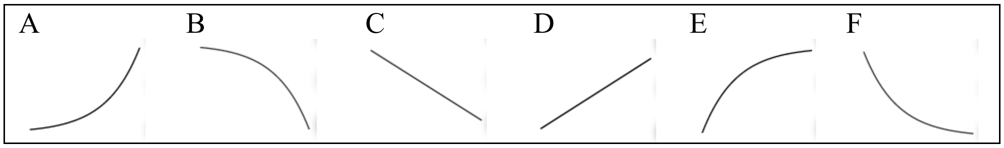
Classifying Parts of Curves
KEY

1. Use the graphs A through F and insert the letter choice in the blank.
Some parts may have more than one answer.



a) Which graphs are increasing? **A, D, E**

b) Which graphs are decreasing? **B, C, F**

c) Which graphs are concave up? **A, F**

d) Which graphs are concave down? **B, E**

e) Which graphs have **no** concavity? **C, D**

f) Which graph could model the following?

In the last quarter of 2009, the economy lost jobs less quickly. **E, F**

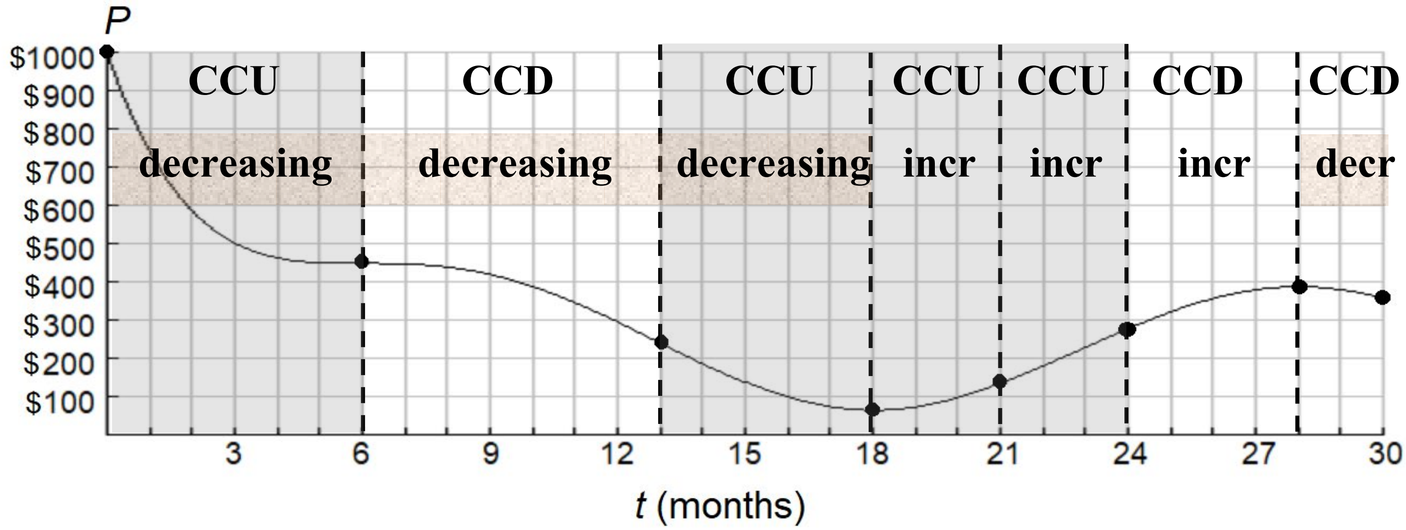
United States economic growth accelerates. **A**

The revenue is climbing at a steady rate. **D**

Greenland ice loss is accelerating. **B**

The rise in the profits is slowing. **E**

2. The graph of a company's profit $P(t)$ in dollars at month t is shown.
Report whole numbers in the blanks below.



a) The domain of $P(t)$ is **0** $\le t \le$ **30**. In interval notation, this is written **[0, 30]**.

b) The range of $P(t)$ is **75** $\le P(t) \le$ **1000**. In interval notation, this is written **[75, 1000]**.

c) Given a function f, we say that $f(c)$ is a **global maximum** or **absolute maximum** of f provided that $f(c) \ge f(x)$ for all x in the whole domain of f.

Given a function f, we say that $f(c)$ is a **global minimum** or **absolute minimum** of f provided that $f(c) \le f(x)$ for all x in the whole domain of f.

For what value(s) of t does $P(t)$ have the following? If none, state so.

i. an *absolute* maximum? at $t =$ **0** **"I am the highest *of all*, king of the hill."**

ii. an *absolute* minimum? at $t =$ **18** **"I am the lowest *of all*, bottom of the barrel."**

d) Given a function f, we say that $f(c)$ is a **local maximum** or **relative maximum** of f provided that $f(c) \ge f(x)$ for all x near c. **Must have a turning point or hump.**

Given a function f, we say that $f(c)$ is a **local minimum** or **relative minimum** of f provided that $f(c) \le f(x)$ for all x near c. **Must have a turning point or hump.**

For what value(s) of t does $P(t)$ have the following? If none, state so. **Exclude endpoints here.**

i. a *relative* maximum? at $t =$ **28** **"I am the highest *among those in my local neighborhood (on my left and on my right)*"**

ii. a *relative* minimum? at $t =$ **18** **"I am the lowest *among those in my local neighborhood.*"**

e) On what open intervals of t is the graph concave up and increasing? **(18, 24)**

An *open* interval does **not** include its endpoints.
An interval which **does** include its endpoints is called *closed*, i.e. the answers to parts a and b.

f) For what value(s) of t does the graph change concavity? These are called the **points of inflection**.
Report whole numbers. $t =$ **6, 13, 24**

g) i. For what value(s) of t does the graph change concavity and is decreasing? $t =$ **13**

ii. For what value(s) of t does the graph change concavity and is increasing? $t =$ **24**

At $t = 6$, the graph is neither decreasing or increasing.
It is called a "stationary point." **(Flat like a parking lot at that point.)**

h) i. On what open intervals of t is the graph concave up? **(0, 6) ∪ (13, 24)**

ii. On what open intervals of t is the graph concave down? **(6, 13) ∪ (24, 30)**