

TMUA 2021 Paper 2 Q6

Consider the following two statements about the polynomial $f(x)$:

P : $f(x) = 0$ for exactly three real values of x

Q : $f'(x) = 0$ for exactly two real values of x

Which one of the following is correct?

- A P is necessary but not sufficient for Q .
- B P is sufficient but not necessary for Q .
- C P is necessary and sufficient for Q .
- D P is not necessary and not sufficient for Q .

We can re-write P and Q , in other words, as follows:

P : $f(x)$ meets the x -axis exactly 3 times.

Q : $f(x)$ has exactly 2 stationary points.

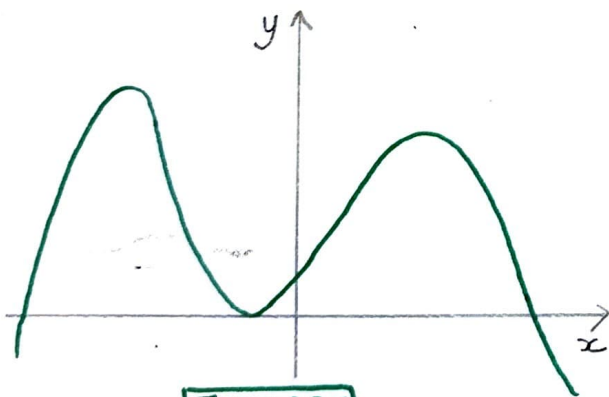


FIGURE 1

FIGURE 1 shows a polynomial function which satisfies P but which does not satisfy Q . Therefore, P is not sufficient for Q . i.e. $P \not\Rightarrow Q$

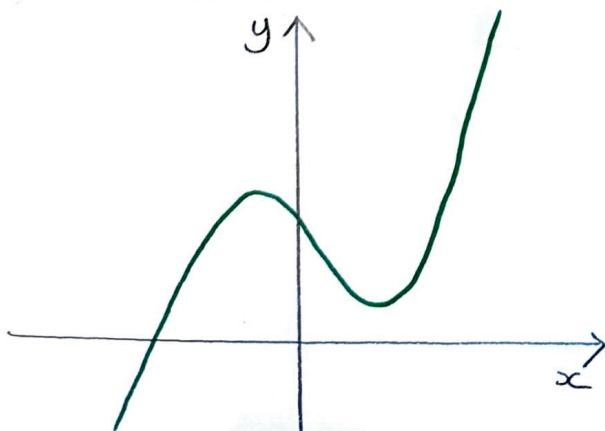


FIGURE 2

FIGURE 2 shows a polynomial function which satisfies Q but which does not satisfy P . Therefore P is not necessary for Q . i.e. $P \not\Leftarrow Q$

So the correct answer is option D.