

TMUA 2021 Paper 2 Question 13



A region R in the (x, y) -plane is defined by the simultaneous inequalities

$$y - x < 3$$

$$y - x^2 < 1$$

Which of the following statements is/are true for every point in R ?

I $-1 < x < 2$

II $(y - x)(y - x^2) < 3$

III $y < 5$

A none of them

B I only

C II only

D III only

E I and II only

F I and III only

G II and III only

H I, II and III

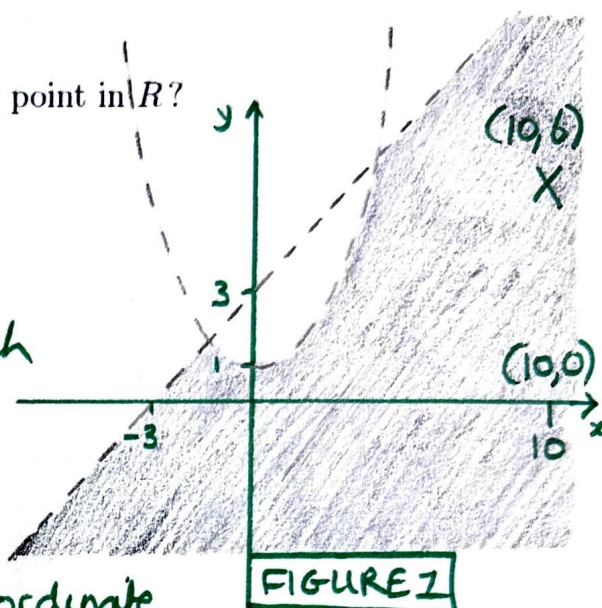


FIGURE 1 shows a sketch in which the shaded area is the region R .

FIGURE 1 specifies two coordinate points, namely $(10, 6)$ and $(10, 0)$

both points lie in R but neither of their x-ordinate satisfies $-1 < x < 2$

Therefore I is not true.

$(10, 6)$ lies in R but 6, its y-ordinate, does not satisfy $y < 5$
Therefore III is not true

Substituting $(10, 0)$ into $(y - x)(y - x^2)$
we get $(0 - 10)(0 - (10)^2)$
 $= (-10)(-100)$
 $= 1000 \neq 3$

This is the "is not less than" symbol

Therefore II is not true

So the correct answer is A