

Quiz8, MAT1375 Professor Chiu

ID: _____

Name: _____

- This quiz consists of one question for a total of 10 points.
- You have 15 minutes to complete the quiz.
- Show all your work and justify your answer.
- Wishing you success.

1. Use the 3-step strategy to solve for x :

$$x^3 - 2x^2 - 5x + 6 \geq 0.$$

(Hint: you can find a root of $x^3 - 2x^2 - 5x + 6$ from $x = \pm 1, \pm 2, \pm 3, \pm 6$)

① $f(x) = x^3 - 2x^2 - 5x + 6$

Solve $x^3 - 2x^2 - 5x + 6 = 0$

$$f(1) = 1^3 - 2 \cdot 1^2 - 5 \cdot 1 + 6 = 0 \Rightarrow x=1 \text{ is a root/ zero/ solution}$$

$\Rightarrow (x-1)$ is a factor of $f(x)$

$$\begin{array}{r} x^2 - x - 6 \\ \hline x-1 | x^3 - 2x^2 - 5x + 6 \\ \quad - x^3 + x^2 \\ \hline \quad -x^2 - 5x \\ \quad - (-x^2 + x) \\ \hline \quad -6x + 6 \\ \quad - (-6x + 6) \\ \hline \quad 0 \end{array}$$

$$\Rightarrow f(x) = (x-1)(x^2 - x - 6) \\ = (x-1)(x+2)(x-3)$$

$$\begin{array}{r} x^2 - x - 6 \\ \hline x-1 | x^3 - 2x^2 - 5x + 6 \\ \quad - x^3 + x^2 \\ \hline \quad -x^2 - 5x \\ \quad - (-x^2 + x) \\ \hline \quad -6x + 6 \\ \quad - (-6x + 6) \\ \hline \quad 0 \end{array}$$

$\Rightarrow f(x)=0$ implies

$$(x-1)(x+2)(x-3) = 0$$

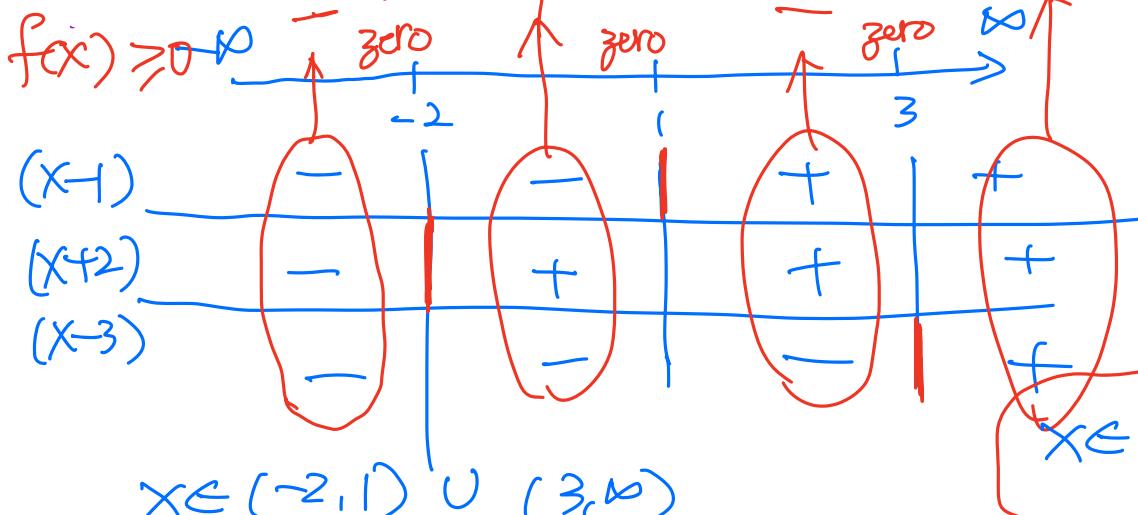
$$x=1 \text{ or } x=-2 \text{ or } x=3$$

$$x=1 \text{ or } x=-2 \text{ or } x=3$$

② Number line

$$f(x) \geq 0 \Rightarrow$$

$x \in (-\infty, -2)$
 $x \in (-2, 1)$
 $x \in (1, 3)$
 $x \in (3, \infty)$



③ Check end point

$$f(-2) = 0 \text{ included}$$

$$f(1) = 0 \text{ included}$$

$$f(3) = 0 \text{ included}$$

$$x \in [-2, 1] \cup [3, \infty)$$