Name: _____

- This quiz consists of **1** question for a total of **10** points.
- You have **15** minutes to complete the quiz.
- Show all work and justify your answers.
- Scientific calculators are allowed.
- Wishing you success.

1. Solve for x:
$$x^3 - 7x^2 + 16x - 10 = 0$$

(*Hint: You can find a root of $x^3 - 7x^2 + 16x - 10$ from $x = 1, -1, 2, -2, 5, -5, 10,$ or -10*)

① Using educated guess to find one root of $x^3 - 7x^2 + 16x - 10$.

$X = 1,$ $(1)^3 - 7(1)^2 + 16 \cdot (1) - 10 = 1 - 7 + 16 - 10 = 0$

$\Rightarrow$ $X = 1$ is a root   and $(X-1)$ is a factor of

$x^3 - 7x^2 + 16x - 10.$

② Using long division to factor $x^3 - 7x^2 + 16x - 10$ by its GCF $(x-1)$.

$x^3 - 7x^2 + 16x - 10 = (x-1) \cdot (x^2 - 6x + 10)$

$$\frac{x^2 - 6x + 10}{x-1 \,\overline{)\, x^3 - 7x^2 + 16x - 10}}$$

$-(x^3 - x^2)$

$\dfrac{x^3}{x} = x^2$ $\begin{array}{c} x-1 \\ \overline{x^3 - x^2} \end{array}$

$-6x^2 + 16x$

$-(-6x^2 + 6x)$

$\dfrac{-6x^2}{x} = -6x$ $\begin{array}{c} x-1 \\ -6x \,\overline{-6x^2 + 6x} \end{array}$

$10x - 10$

$-(10x - 10)$

$\dfrac{10x}{x} = 10$ $\begin{array}{c} x-1 \\ 10 \,\overline{)\,10x - 10} \end{array}$

0

③ Find all roots of $x^3 - 7x^2 + 16x - 10.$

$x^3 - 7x^2 + 16x - 10 = (x-1) \cdot (x^2 - 6x + 10) = 0$

$\Rightarrow X - 1 = 0$ or $1x^2 - 6x + 10 = 0$
      $+1 \quad +1$ $A = 1, B = -6, C = 10$

$\Rightarrow X = 1$

$X = \dfrac{-(-6) \pm \sqrt{(-6)^2 - 4 \cdot 1 \cdot 10}}{2 \cdot 1} = \dfrac{6 \pm \sqrt{36 - 40}}{2}$

$36 - 40 = -4$

$\sqrt{-4} = \sqrt{4 \cdot i}$

$= 2i$

$\Rightarrow x = 1 \quad , \quad x = \dfrac{6 \pm 2i}{2} = \dfrac{2(3 \pm i)}{2} = 3 \pm i.$

$\Rightarrow x = 1, \quad x = 3 + i \quad , \quad x = 3 - i.$