Name: _____

1. Solve

Quadratic formula
$Ax^2 + Bx + C = 0$

$X = \dfrac{-B \pm \sqrt{B^2 - 4AC}}{2A}$

$\boxed{1}\ x^2 + 8x + 18 = 0$

$A = 1,\ B = 8,\ C = 18$

$64 - 72 = -8$

$X = \dfrac{-8 \pm \sqrt{(8)^2 - 4 \cdot 1 \cdot 18}}{2 \cdot 1} = \dfrac{-8 \pm \sqrt{-8}}{2}$

$\Rightarrow X = \dfrac{-8 \pm \sqrt{8}\,i}{2} = \dfrac{-8 \pm 2\sqrt{2}\,i}{2} = \dfrac{2(-4 \pm \sqrt{2}\,i)}{2} = \boxed{-4 \pm \sqrt{2}\,i}$

2. Solve

$x^3 - 5x^2 + 8x - 4 = 0$

① Find a root of $x^3 - 5x^2 + 8x \boxed{-4}$:
educated guess: a factor of "-4"
$\Rightarrow X = 1,\ X = 2,\ X = 4$
$\quad X = -1,\ X = -2,\ X = -4$

• $X = 1,\ (1)^3 - 5(1)^2 + 8(1) - 4$
$\quad = 1 - 5 + 8 - 4 = 0$

$\Rightarrow X = 1$ is a root and
$(X-1)$ is a factor of
$x^3 - 5x^2 + 8x - 4$

② factor $x^3 - 5x^2 + 8x - 4$
$\quad = (X-1)(\ ? \ )$

$\dfrac{x^3}{x} = x^2,\ x^2\boxed{x^3 - x^2}$

$\dfrac{-4x^2}{x} = -4x,\ -4x\boxed{-4x^2\ |\ 4x}$

$\dfrac{4x}{x} = 4,\ 4\boxed{4x\ |\ -4}$

$\begin{array}{r} x^2 - 4x + 4 \\ x-1\ \overline{\smash{)}\ x^3 - 5x^2 + 8x - 4} \\ \underline{-(x^3 - x^2)} \\ -4x^2 + 8x \\ \underline{-(-4x^2 + 4x)} \\ 4x - 4 \\ \underline{-(4x - 4)} \\ 0 \end{array}$

$\Rightarrow\ ? = x^2 - 4x + 4$

③ $x^3 - 5x^2 + 8x - 4 = 0 \Rightarrow (X-1)\cdot(x^2 - 4x + 4) = 0$

$\Rightarrow X - 1 = 0$ or $x^2 - 4x + 4 = 0$
$\qquad\quad +1\ \ +1 \qquad \quad x \qquad -2$
$\qquad\qquad\qquad\qquad\qquad\quad x \qquad -2$

$\Rightarrow X = 1$ or $(X-2)(X-2) = 0$
$\Rightarrow X = 1$ or $(X-2) = 0$ or $(X-2) = 0$

$\boxed{\begin{array}{l} X = 1 \\ X = 2 \\ X = 2 \end{array}}$