[I] (4pts) Solve

\[ 2x^2 + 3x + 2 = 0, \]

within the complex number system \( \mathbb{C} \). Use quadratic formula.

[Answer]:

\[ x = \]
[II] (4pts) Let

$$\alpha = 3 + \sqrt{-1} \cdot 2, \quad \beta = 4 - \sqrt{-1} \cdot 5.$$  

(1) \quad \alpha + \beta = \quad (\text{No work necessary}).

(2) \quad (\text{Show work}).

$$\alpha \beta =$$

$$=$$

$$=$$

$$= \quad .$$
[III] (8pts) Let

\[ \alpha = -6 + \sqrt{-1} \cdot 2, \quad \beta = \frac{-1 + \sqrt{-1} \cdot \sqrt{7}}{2}, \]
\[ \gamma = \log 2 + \sqrt{-1} \pi, \quad \delta = 3. \]

(1) Re \( \alpha = \) \quad Im \( \alpha = \)

\quad ,

(2) Re \( \beta = \) \quad Im \( \beta = \)

\quad ,

(3) Re \( \gamma = \) \quad Im \( \gamma = \)

\quad ,

(4) Re \( \delta = \) \quad Im \( \delta = \)

\quad .
[IV] (4pts) True or false:

(1) The equation $a x^2 + b x + c = 0$ with $x$ unknown and $a, b, c \in \mathbb{R}$ known has roots within $\mathbb{C}$.

□ True. □ False. (Check one.)

(2) Any complex number has a square root within $\mathbb{C}$.

□ True. □ False. (Check one.)

(3) For $\alpha, \beta \in \mathbb{C}$,

$$\operatorname{Re} (\alpha \beta) = \left( \operatorname{Re} \alpha \right) \left( \operatorname{Re} \beta \right).$$

□ True. □ False. (Check one.)

(4) For $\alpha \in \mathbb{C}$,

$$\operatorname{Re} \alpha = \alpha$$

implies $\alpha \in \mathbb{R}$.

□ True. □ False. (Check one.)