

(1). Evaluate the following expression.

$$(-i)^6 \sqrt{-49}$$

$$= [(-1)(i)]^6 \sqrt{(-1)(49)}$$

$$= (-1)^6 (i)^6 \sqrt{-1} \sqrt{49}$$

$$= 1 \cdot i^6 \cdot i \cdot 7$$

$$= i^{6+1} \cdot 7$$

$$= 7 i^{4+3}$$

$$= 7 i^4 i^3$$

$$= 7 i^3$$

$$= 7(i^{2+1})$$

$$= 7(i^2)(i)$$

$$= 7(-1)(i)$$

$$= \boxed{-7i}$$

$$= 1 \cdot i^2 \cdot i \cdot 7$$

$$= (-1)(i)(7)$$

$$= -7i$$

(2) Simplify the following square root expression.

$$(\sqrt{-72})(\sqrt{-2})$$

$$= \sqrt{(-1)(72)} \cdot \sqrt{(-1)(2)}$$

$$= \sqrt{-1} \sqrt{72} \cdot \sqrt{-1} \sqrt{2}$$

$$= i \cdot \sqrt{72} \cdot i \sqrt{2}$$

$$= i^2 (\sqrt{72})(\sqrt{2})$$

$$= (-1) \sqrt{72 \cdot 2}$$

$$\sqrt{-72} = \sqrt{2 \cdot 2 \cdot 2 \cdot 3 \cdot 3} \cdot \sqrt{-1} = 2 \cdot 3 \sqrt{2} i = 6\sqrt{2} i$$

$$\sqrt{-2} = \sqrt{2} i$$

Recall $\sqrt{x} \cdot \sqrt{x} = x$ for any $x \in \mathbb{R}$

$$\sqrt{-72} \sqrt{-2} = (6\sqrt{2} i)(\sqrt{2} i)$$

$$= 6(\sqrt{2})^2 i^2$$

$$= 6 \cdot 2 \cdot (-1) = \boxed{-12}$$

(3) Simplify the following expression.

$$(2 - 9i)(2 + 9i)$$

$$= 2^2 - (9i)^2$$

$$= 4 - 81i^2$$

$$= 4 - 81(-1)$$

$$= 4 + 81 = \boxed{85}$$

$$= 2^2 + 9^2$$

$$= 4 + 81$$

$$= \boxed{85}$$

recall $(a - bi)(a + bi)$

$$= a^2 + b^2.$$

(4) Simplify the following expression.

$$\frac{40}{2 + 6i}$$

$$= \frac{40}{2 + 6i} \cdot \frac{(2 - 6i)}{(2 - 6i)}$$

$$= \frac{40(2 - 6i)}{(2 + 6i)(2 - 6i)}$$

$$= \frac{80 - 240i}{2^2 + 6^2}$$

$$= \frac{80 - 240i}{4 + 36}$$

$$= \frac{80 - 240i}{40}$$

$$= \frac{80}{40} - \frac{240i}{40}$$

$$= 2 - 6i$$

(5) Factor the following trinomial

$$6v^3 + 3v^2 - 9v$$

$$= 3v(2v^2 + v - 3)$$

$$= 3v(2v^2 + (-2+3)v - 3)$$

$$= 3v(2v^2 - 2v + 3v - 3)$$

$$= 3v[(2v)(v-1) + 3(v-1)]$$

$$= 3v[(v-1)(2v+3)]$$

$$= (3v)(v-1)(2v+3)$$

$$\begin{array}{l} 2(-3) = -6 \\ \quad \swarrow \quad \searrow \\ \quad 1, -6 \quad -1, 6 \\ \quad 2, -3 \quad \boxed{-2, 3} \end{array}$$

B 1) The best indicator that I will use factoring by grouping is...

- A. Descending Order of Exponents
- B. Four Terms
- C. A degree of 3

B 2) Which of the following does NOT factor?

- A. Diff. of Squares
- B. Sum of Squares
- C. Diff. of Cubes
- D. Sum of Cubes

A 3) The complex conjugate of $4-3i$ is...

- A. $4+3i$
- B. $-4+3i$
- C. $-4-3i$
- D. $3i$

D 4) The product of $4-3i$ and its conjugate is... $4^2 + 3^2 = 16 + 9 = 25$

- A. $16+9i^2$
- B. $16-9i^2$
- C. 7
- D. 25
- E. None of these

B 5) If I factor $4x^2 - 49$, one of the factors will be... $2x \pm 7$

- A. $x+7$
- B. $2x+7$
- C. $4x-7$
- D. None of these

B 6) If I factor $6x^2 + 11x - 10$, one of the factors will be...

- A. $6x+2$
- B. $2x+5$
- C. $x-1$
- D. It is prime

$6 \cdot (-10) = -60$ $6x^2 + 11x - 10$
 $1, -60$ $= 2x(3x-2)$
 $2, -30$ $+ 5(3x-2)$
 $3, -20$ $= (2x+5)(3x-2)$
 $4, -15$ $\neq 4, 15$

D 7) If I factor $x^2 + 3x + 3$, one of the factors will be...

$b^2 - 4ac < 0$

- A. $x+1$
- B. $x+3$
- C. $x-1$
- D. It is prime

D 8) The GCF between $9x^2y$, $18xy^2$, and $27x^2y^2$ is...

$9xy$

- A. $3x^2y^2$
- B. $3x^2y$
- C. $9x^2y$
- D. $9xy$

B 9) i^{127} simplifies to...

$i^{120+7} = i^7 = i^3 = -i$

- A. i
- B. $-i$
- C. 1
- D. -1