

MAC1105 College Algebra
1.3 Practice Problems

1. Simplify the expression, writing your answer in $a+bi$ form.

$$\begin{aligned} \text{a) } & 6 - (-5 + 4i) - (-13 - i) \\ & = 6 + 5 - 4i + 13 + i \\ & = 6 + 5 + 13 - 4i + i \\ & = 11 + 13 - 3i \\ & = 24 - 3i \end{aligned}$$

$$\begin{aligned} \text{b) } & (7 - 5i)(-2 - 3i) \\ & = -14 - 21i + 10i + 15i^2 \\ & = -14 - 11i + 15(-1) \\ & = -14 - 11i - 15 \\ & = -14 - 15 - 11i \\ & = -29 - 11i \end{aligned}$$

$$\begin{aligned} \text{c) } & \frac{8i}{4-3i} \\ & = \frac{8i}{4-3i} \cdot \frac{4+3i}{4+3i} \\ & = \frac{8i(4+3i)}{(4-3i)(4+3i)} \\ & = \frac{32i + 24i^2}{16 + 12i - 12i - 9i^2} \\ & = \frac{32i + 24(-1)}{16 - 9(-1)} \\ & = \frac{32i - 24}{16 + 9} \\ & = \frac{32i - 24}{25} \\ & = \frac{-24 + 32i}{25} \\ & = \frac{-24}{25} + \frac{32}{25}i \end{aligned}$$

$$\begin{aligned} \text{d) } & (-3 + \sqrt{-4})^2 \\ & = (-3 + 2i)^2 \\ & = (-3 + 2i)(-3 + 2i) \\ & = 9 - 6i - 6i + 4i^2 \\ & = 9 - 12i + 4(-1) \\ & = 9 - 12i - 4 \\ & = 5 - 12i \end{aligned}$$

$$\begin{aligned}
 \text{e. } & (7-4i)+(3-2i) \\
 & = 7-4i+3-2i \\
 & = 10-6i
 \end{aligned}$$

$$\begin{aligned}
 \text{f. } & (-2+7i)-(5+6i) \\
 & = -2+7i-5-6i \\
 & = -7+i
 \end{aligned}$$

$$\begin{aligned}
 \text{g. } & (2+5i)^2 \\
 & = (2+5i)(2+5i) \\
 & = 4+10i+10i+25i^2 \\
 & = 4+20i+25(-1) \\
 & = 4+20i-25 \\
 & = -21+20i
 \end{aligned}$$

$$\begin{aligned}
 \text{h. } & \sqrt{-81} \cdot \sqrt{-36} \\
 & = 9i \cdot 6i \\
 & = 54i^2 \\
 & = 54(-1) \\
 & = -54
 \end{aligned}$$

$$\text{i. } i^{37} = i \leftarrow$$

$$4 \overline{) \begin{array}{r} 9 \\ 37 \\ 36 \\ \hline 1 \end{array}}$$

- ① $i^1 = i$
- ② $i^2 = -1$
- ③ $i^3 = -i$
- ④ $i^4 = 1$