

#1

$$a) \sqrt{x^2} = \sqrt{200}$$

$$x = \pm \sqrt{2 \cdot 2 \cdot 2 \cdot 5 \cdot 5}$$

$$x = \pm 10\sqrt{2}$$

$$\begin{array}{r} 2 \overline{)200} \\ 2 \overline{)100} \\ 2 \overline{)50} \\ 5 \overline{)25} \\ 5 \end{array}$$

$$\begin{array}{r} 2 \overline{)200} \\ 100 \end{array}$$

$$b) \begin{array}{r} 5x^2 + 180 = 0 \\ \underline{-180} \quad \underline{-180} \\ 5x^2 = -180 \\ \underline{5} \quad \underline{5} \end{array}$$

$$\sqrt{x^2} = \sqrt{-36}$$

$$x = \pm 6i$$

$$c) \frac{\cancel{3}(x+4)^2}{\cancel{3}} = \frac{75}{3}$$

$$\sqrt{(x+4)^2} = \sqrt{25}$$

$$x+4 = \pm 5$$

$$x = -4 \pm 5$$

$$x = -4 + 5$$

$$\boxed{x = 1}$$

$$x = -4 - 5$$

$$\boxed{x = -9}$$

$$d) \frac{\cancel{4}(x-2)^2}{\cancel{4}} = \frac{-1}{4}$$

$$\sqrt{(x-2)^2} = \sqrt{-\frac{1}{4}}$$

$$x-2 = \pm \frac{1}{2}i$$

$$+2 \quad +2$$

$$\boxed{x = 2 \pm \frac{1}{2}i}$$

$$\frac{\sqrt{-1}}{\sqrt{4}}$$

$$\begin{aligned}
 g) \quad & 3(x+5)^2 + 4 = 52 \\
 & \underline{-4 \qquad \qquad \qquad -4} \\
 & \frac{3(x+5)^2}{3} = \frac{48}{3} \\
 & \sqrt{(x+5)^2} = \sqrt{16} \\
 & \frac{x+5}{-5 \quad -5} = \pm 4 \\
 & \underline{-5 \quad -5} \\
 & x = -5 \pm 4 \\
 & \quad \downarrow \qquad \qquad \downarrow \\
 & x = -5 + 4 \qquad x = -5 - 4 \\
 & \boxed{x = -1} \qquad \boxed{x = -9}
 \end{aligned}$$

$$\begin{aligned}
 h) \quad & \frac{-2(x+1)^2}{-2} = \frac{72}{-2} \\
 & \sqrt{(x+1)^2} = \sqrt{-36} \\
 & \frac{x+1}{-1} = \frac{\pm 6i}{-1} \\
 & \underline{\hspace{10em}} \\
 & \boxed{x = -1 \pm 6i}
 \end{aligned}$$

$$i) \quad \frac{1}{3}(x-9)^2 + 2 = -22$$

$$\frac{3}{1} \cdot \frac{1}{3}(x-9)^2 = -24 \cdot \frac{3}{1}$$

$$\sqrt{(x-9)^2} = \sqrt{-72}$$

$$x-9 = \pm 6i\sqrt{2}$$

$$\frac{x-9}{+9} = \pm 6i\sqrt{2} \quad \frac{+9}{+9}$$

$$x = 9 \pm 6i\sqrt{2}$$

$$\begin{array}{r} 2 \overline{)72} \\ 2 \overline{)36} \\ 2 \overline{)18} \\ 3 \overline{)9} \\ 3 \end{array}$$

#2

$$a) \quad (3+2i) + (-5+8i)$$

$$-2 + 10i$$

$$\begin{array}{r} \text{b) } (4+2i) - (-1+5i) \\ \underline{4+2i} \quad \underline{+1} \quad \underline{-5i} \\ 5 - 3i \end{array}$$

$$\begin{array}{r} \text{c) } (5-8i) - (2+9i) \\ \underline{5-8i} \quad \underline{-2} \quad \underline{-9i} \\ 3 - 17i \end{array}$$

$$d) \quad (5-4i)(3+6i)$$

$$i^2 = -1$$

$$(5)(3) + (5)(6i) + (-4i)(3) + (-4i)(6i)$$

$$15 \quad + 30i \quad - 12i \quad - 24i^2$$

$$15 \quad + 18i \quad - 24(-1)$$

$$\underline{15} \quad + 18i \quad + 24$$

$$\boxed{39 + 18i}$$

$$e) \quad (4+8i)(4-8i)$$

$$(4)(4) + (4)(-8i) + (8i)(4) + (8i)(-8i)$$

$$16 \quad - 32i \quad + 32i \quad - 64i^2$$

$$16 \quad - 64(-1)$$

$$16 \quad + 64$$

$$\boxed{80}$$

$$f) (9 - 7i)^2$$

$$(9 - 7i)(9 - 7i)$$

$$(9)(9) + (9)(-7i) + (-7i)(9) + (-7i)(-7i)$$

$$81 \quad \underline{-63i} \quad \underline{-63i} \quad + 49i^2$$

$$81 \quad - 126i \quad + 49(-1)$$

$$\underline{81} \quad - 126i \quad \underline{-49}$$

$$\boxed{32 - 126i}$$

$$g) \frac{8}{3i} \cdot \frac{i}{i} = \frac{8i}{3i^2} = \frac{8i}{3(-1)} = \boxed{\frac{8i}{-3}}$$

$$j) \quad i(9+2i) - 7(6-3i)$$
$$\quad \underline{9i + 2i^2} \quad - \quad \underline{-42 + 21i}$$

$$30i + 2(-1) - 42$$

$$30i \quad \underline{-2} \quad \underline{-42}$$

$$30i - 44$$

$$\boxed{-44 + 30i}$$