

Show all work for problems.

5) 1) Write in a+bi form.

$$5 + 3\sqrt{-49}$$

$$5 + 3 \cdot (7i)$$

$$\boxed{5 + 21i}$$

2) Simplify to a+bi form.

$$\sqrt{81} + \sqrt{-27} - \sqrt{49} + \sqrt{-75}$$

$$9 + i\sqrt{9}\sqrt{3} - 7 + i\sqrt{25}\sqrt{3}$$

$$9 + 3i\sqrt{3} - 7 + 5i\sqrt{3}$$

$$\boxed{2 + 8i\sqrt{3}}$$

3) If $X = YZ$ and $Y = 3 + 4i$ and $Z = -5 - 7i$, then find X.

$$X = YZ = (3 + 4i)(-5 - 7i)$$

$$= -15 - 21i - 20i - 28i^2$$

$$-15 - 21i - 20i + 28$$

$$\boxed{13 - 41i}$$

4) Simplify to a+bi.

$$-7i^{19} + 5i^{10} + 10i^{21} - 9i^{40}$$

$$-7(-i) + 5(-1) + 10(i) - 9(1)$$

$$+7i - 5 + 10i - 9$$

$$\boxed{-14 + 17i}$$

5) Simplify.

$$i^{13} * i^7$$

$$= i^{13+7} = i^{20} = \boxed{1}$$

$$\text{OR } (i)^4(-i) = -i^2 = -(-1) = \boxed{1}$$

6) Simplify

$$\frac{(6+2i)(7+4i)}{7-4i} = \frac{42 + 24i + 14i + 8i^2}{49 + 28i - 28i - 16i^2}$$

$$= \frac{42 + 38i - 8}{49 + 16}$$

$$= \frac{34 + 38i}{65} = \boxed{\frac{34}{65} + \frac{38i}{65}}$$

7) Write in a+bi form.

$$i^{43} + i^{54}$$

$$(-i) + (-1) = \boxed{-1 - i}$$

8) Find the sum of $(3 + \sqrt{-49})$ and $(-2 - \sqrt{-81})$.

$$(3 + 7i) + (-2 - 9i)$$

$$\boxed{1 - 2i}$$

9) Simplify:

$$\frac{7}{3-\sqrt{5}} \cdot \frac{3+\sqrt{5}}{3+\sqrt{5}} = \frac{21 + 7\sqrt{5}}{9 + 3\sqrt{5} - 3\sqrt{5} - 5}$$

$$= \frac{21 + 7\sqrt{5}}{4}$$