Lesson 1 - Suggested Problems

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Solutions

1. $(3-2i)+(-7+5i) = (3-7)+(-2+5)i$
   $= -4+3i$

2. $(3-2i)-(-7+5i) = (3-(-7))-(-2-5)i$
   $= 10-7i$

3. $(3-2i)(-7+5i) = (3)(-7)+(3)(5)i+(-2)(-7)i+(-2)(5)i^2$
   $= -21+15i+14i-10i^2$
   $= -10i^2+29i-21$

4. $$\frac{1}{1-i} = \frac{1}{1-i}\left(\frac{1+i}{1+i}\right) = \frac{1+i}{1-i^2} = \frac{1+i}{2} = \frac{1}{2}+\frac{1}{2}(i)$$

5. $$\begin{aligned}\frac{3-2i}{-7+5i} &= \frac{3-2i}{-7+5i}\left(\frac{-7-5i}{-7-5i}\right)\\ &= \frac{-21-15i+14i+10i^2}{49-25i^2}\\ &= \frac{-31-i}{74}\\ &= \frac{-31}{74}-\frac{1}{74}i\end{aligned}$$

6. $\overline{5-12i} = 5+21i$

7. $|5 - 12i| = \sqrt{5^2 + (-12)^2} = \sqrt{25 + 144} = \sqrt{169} = 13$

8. $|5 + 12i| = \sqrt{5^2 + (12)^2} = \sqrt{25 + 144} = \sqrt{169} = 13$

9. $i^{100} = 1$, since $100 \pmod 4 = 0$ and $i^0 = 1$

10. $i^{49} = i$, since $49 \pmod 4 = 1$ and $i^1 = i$

    Find all real or complex solutions:

11. $4x^2 + 9 = 0$

12. $x^2 + z = -2$

    Illustrate on a graph the parallelogram or triangle law for the expressions:

13. Let $z = 2 + i$ and $w = 3 - 4i$. Use a graph to illustrate $z, w, |z - w|$.