1. (5 pts) Solve: \( 4(x + 3) = 42 - 7(2x + 6) \)

2. (5 pts) Find the zero: \( f(x) = 3x - 27 \)

3. (10 pts) Find all solutions:
   
   (a) \( x^2 + 4 = 0 \)
   
   (b) \( x^4 - 5x^2 + 4 = 0 \)
4. (5 pts) Simplify and write answer in the form $a + bi$: \[ \frac{3 + 2i}{1-i} + \frac{7 - 5i}{1-i} \]

5. (5 pts) Simplify: $i^{84}$

6. (10 pts) For $f(x) = x^2 - 2x + 2$

   (a) find the vertex:

   (b) find the range:
7. (10 pts) Solve the following inequalities:

   (a) \(-5 \leq 3 - 2x < 5\)

   (b) \(|x - 2| > 21\)

8. (10 pts) If possible, use the intermediate value theorem to determine if the following functions have real zeros between \(a\) and \(b\) where \(a = -2\) and \(b = -1\):

   (a) \(f(x) = x^2 + 1\)

   (b) \(f(x) = 2x^3 - x^2 - 4x + 3\)
9. (5 pts) Use synthetic division to determine whether the numbers 5 and 2 are zeros of the polynomial \( f(x) = x^3 - x^2 - x - 2 \).

10. (5 pts) Find the quotient \( Q(x) \) and the remainder \( R \) for \((x^3 - 9x^2 + 23x - 15) \div (x + 2)\):

11. (10 pts) For \( f(x) = x^3 - 27 \),

(a) find the rational zeros, and then find the other zeros:

(b) factor into linear factors:
12. (5 pts) Find a polynomial of lowest degree with rational coefficients that has the zeros \( \sqrt{7} \) and \( 2i \):

\[ \text{polynomial} \]

13. (15 pts) Solve:

(a) \[ \frac{3}{m + 1} + \frac{2}{m - 1} = \frac{5}{m^2 - 1} \]

(b) \( \sqrt[3]{5x - 7} = 2 \)

(c) \[ |x - 7| + 3 = 10 \]