1. Find the following product and write the result in standard form, a+bi. \((-5 + 2i)(1 + i)\)

2. Divide the following complex numbers and express the result in standard form. \(\frac{4 + 4i}{5 + i}\)

3. Find the following product and write the result in standard form, a+bi. \((2 + i)^2 - (4 - i)^2\)

4. Find the vertex, x-intercepts, axis of symmetry, domain and range for the following parabola:
   \(f(x) = (x+4)^2 - 2\)

5. Complete the square in the following parabola to determine the vertex:
   \(f(x) = 2x^2 + 12x + 703\)

6. Sketch a graph of the function \(f(x) = 3(x+12)^3(x+6)^2(x)(x-4)^4\). Show the end behavior and the behavior of the function at all the x-intercepts.

7. Use long division to divide: \((4x^3 + 6x^2 + 3x - 1) \div (2x^2 + 1)\)

8. Use synthetic division to divide: \((3x^4 + 11x^3 - 20x^2 + 7x + 35) \div (x + 5)\)
   
   *Use the function \(f(x) = 5x^4 + x^3 - 9x^2 - 4x + 4\) to answer problems 9 and 10.*

9. Use the Rational Zero Theorem to list all possible rational zeros

10. Use Descartes’ Rule to determine the possible number of positive and negative real zeros.

11. Find a 3rd degree polynomial that has zeros of 2 and (2-3i). The polynomial must be equal to -10 when x is 1.

12. Find ALL zeros of the polynomial function and write it as a product of linear factors.
   \(f(x) = x^4 - 6x^3 + x^2 + 24x + 16\)

   *For the rational functions given in 13 and 14, find the domain and any asymptotes that the function may have.*

13. \(r(x) = \frac{2x - 4}{x + 3}\)

14. \(t(x) = \frac{4x^2 - 16x + 16}{2x - 3}\)

   *For 15 and 16, solve the given inequalities. Put answer in interval notation.*

15. \(x^3 + 2x^2 > 3x\)

16. \(\frac{x + 3}{x - 4} \leq 5\)