SHOW ALL YOUR WORK
This includes any graphs that you obtain from your calculator. If you use a calculator to generate a graph, be sure to sketch a copy of that graph on your exam paper.

1. (10 pts.) Use the graphs of $f(x)$ and $g(x)$ shown below to compute the following numbers.
   
   i) $(f + g)(0)$
   ii) $(f/g)(0)$
   iii) $(f \circ g)(0)$
   iv) $(g \circ f)(0)$
   
   ![Graph of f(x)](image1)
   ![Graph of g(x)](image2)

2. (10 pts.) Compute $f^{-1}(12)$ for the function
   
   $f(x) = x^2 + 4x; \quad x \leq -2$

3. (10 pts.) Find the quotient and remainder:
   
   $\frac{2x^3 - x^2 - 5}{x + 3}$
4. (10 pts.) Find all real and complex roots of

\[ p(x) = x^4 + x^3 + 4x^2 - x - 5 \]

Be sure to show all your work.

5. (10 pts.) Find a fourth degree polynomial with roots 0, 1 and 2 + i.

6. (10 pts.) Express the following in the form \( a + bi \).

\[ \frac{-i}{2 + 5i} \]

7. (12 pts.) Graph the function

\[ f(x) = \frac{4x^3 - 12x^2}{(x + 2)^3} \]

Your graph must include exact roots, exact asymptotes, and correct behavior near roots and asymptotes. You must show all work that leads to these conclusions.
8. (10 pts.) Solve the system
\[
\begin{align*}
2x + 3y &= 65 \\
3x - 2y &= 0
\end{align*}
\]

9. (10 pts.) Solve the system
\[
\begin{align*}
xy &= 4 \\
x + 2y &= 6
\end{align*}
\]

10. (8 pts.) Suppose that \( f(x) = p(x)/q(x) \) is the rational function graphed below. Answer the following questions about \( p(x) \) and \( q(x) \).

(a) What is smallest possible degree of \( p(x) \)?
(b) What are the factors of \( p(x) \)?
(c) What is smallest possible degree of \( q(x) \)?
(d) What are the factors of \( q(x) \)?