

**Problem 1.** Find the quotient and remainder of

$$(x^4 + 5x^2 + x + 3) \div (x^2 + 4).$$

**Problem 2.** Find the intercepts ( $x$  and  $y$ ) and asymptotes (vertical and horizontal) of

$$f(x) = \frac{x - 4}{x + 1},$$

and sketch its graph.

**Problem 3 (Extra Credit).** The locus of the equation  $y = x^2$  is a parabola whose vertex is at the origin. The line  $y = -3x + 4$  intersects this circle in two points. Find these points. Justify your answer.