

1. 10 pts. Find the inverse of $f(x) = x^2 + 16$, $x \geq 0$.
2. 10 pts. each Let $g(x) = \frac{5x - 3}{x + 6}$.
 - (a) Find the inverse of g .
 - (b) Find the domain and range of both g and g^{-1} .
3. 10 pts. Find the slope and y -intercept of the linear function $h(x) = 3$, and also state the domain and range of h .
4. 10 pts. each Consider the quadratic function $f(x) = 2x^2 - x + 2$.
 - (a) Write $f(x)$ in the form $a(x - h)^2 + k$.
 - (b) Find the vertex, domain, and range of f .
5. 10 pts. each Solve each enchanted inequality algebraically.
 - (a) $x(x + 1) < 30$
 - (b) $2x^3 > -8x^2$
 - (c) $\frac{x + 4}{x - 2} \leq 1$
6. 10 pts. Construct a polynomial function f of degree 3 and having 2, -1 , -3 as zeros.¹
7. 15 pts. Find all asymptotes for the rational function $Q(x) = \frac{x^3}{x^2 - 4}$
8. 10 pts. Find the bounds to the zeros of $f(x) = x^4 + 3x^3 - 5x^2 + 9$.
9. Let $f(x) = 2x^4 + 11x^3 - 5x^2 - 43x + 35$.
 - (a) 10 pts. Find all the zeros of f exactly.
 - (b) 5 pts. Fully factor $f(x)$.
10. 10 pts. Construct a degree 3 polynomial function f with *real* coefficients and having zeros 2 and $4 - i$. Write the polynomial in standard form.²
11. 15 pts. Find the complex zeros of $f(x) = x^3 - 1$, and write $f(x)$ in *fully* factored form.

EXTRA CREDIT (20 pts.) – Using the Rational Zeros Theorem and/or factoring, find all zeros of the function $f(x) = x^8 - x^7 + 8x^5 - 7x^4 - x^3 + 8x - 8$. Show work.

¹For 10 points extra credit: make f such that $f(4) = 10$.

²“Standard form” means in the form $a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$.