

1. 10 pts. Find the zeros of

$$f(x) = 8x^2(x + 1)^7(x - 6),$$

and state the multiplicity of each.

2. 10 pts. A stone thrown downward with an initial velocity of 34.3 m/s will travel a distance of  $s$  meters, where

$$s(t) = 4.9t^2 + 34.3t$$

for time  $t$  in seconds. If a stone is thrown downward at 34.3 m/s from a height of 294 m, how long will it take the stone to hit the ground?

3. 5 pts. each For the function  $f(x) = x^{10} - 2x^5 + 4x - 2$  find the following.

- (a) The maximum number of  $x$ -intercepts that the graph of  $f$  can have.  
(b) The maximum number of turning points that the graph of  $f$  can have.

4. 10 pts. Use synthetic division to find the quotient and remainder:

$$(4x^5 - 2x^2 + 1) \div (x - 2).$$

5. 15 pts. Factor the polynomial

$$f(x) = x^4 - 4x^3 - 7x^2 + 34x - 24,$$

then solve the equation  $f(x) = 0$ .

6. 10 pts. Find a polynomial of degree 4 with  $-2$  as a zero of multiplicity 1,  $3$  as a zero of multiplicity 2, and  $-1$  as a zero of multiplicity 1.

7. 10 pts. Find a polynomial function of lowest degree with rational coefficients that has  $2 - i$  and  $-1$  as some of its zeros.

8. 15 pts. Find all the zeros of

$$f(x) = x^3 - 2x + 4,$$

and also factor  $f(x)$  into linear factors.

9. 10 pts. Determine the vertical asymptotes of the rational function

$$h(x) = \frac{x^2 - 4}{x(x - 2)(x - 4)}$$

10. 10 pts. each Solve each inequality, and state the solution set in interval notation.

(a)  $x^2 + 4x + 7 \geq 5x + 9$

(b)  $x^5 + x^2 < 2x^3 + 2$

(c)  $\frac{x}{x+3} < -1$