

1. 10 pts. Find the zeros of

$$f(x) = x^3(x - 1)^5(x + 4),$$

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:

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

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

$$h(x) = \frac{x^2 - 4}{x(x + 2)(x + 6)}$$

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) $\frac{x}{x-5} > 2$