

Supplement to Test 2

1. (32) For the polynomial $p(x) = 2x^5 + x^4 - 6x^3 - 3x^2 - 8x - 4$,

a. (6) Use Descartes' rule of signs and other facts to give the possibilities for the roots: positive, negative, complex.

b. (6) Use synthetic division to find an upper bound & a lower bound for the roots.

c. (5) Use the rational roots theorem to list all possible rational roots.

d. (5) Pare down the list of possible rational roots.

e. (10) Find all roots of the polynomial.

2. (20) For the polynomial $p(x) = (x-1)(x+1)^2(x-2)^3(x+2)^4$,

a. (3) Approximate p by a power function.

b. (5) List the zeroes and their multiplicities.

c. (2) Find the y -intercept.

d. (10) Make a schematic sketch of the graph of $p(x)$.

3. (28) For the rational function $r(x) = \frac{(x+1)(x-2)^2}{x(x-1)^2(x+2)^3}$,

a. (3) Approximate r by a power function.

b. (3) Determine the horizontal asymptotes, if any.

c. (2) Find the y -intercept, if any.

c. (5) List the zeroes and their multiplicities.

d. (5) List the vertical asymptotes and their multiplicities.

d. (10) Make a schematic sketch of the graph of $r(x)$.

4. (7) Find a polynomial p of least degree that has as roots 0, 1, -5, and 5 of multiplicities 1, 2, 1, and 1 respectively, and which satisfies $p(-1) = 6$.