

NAME: \_\_\_\_\_

**DO NOT** write your answers here. Do it in other sheets and **show all your work**.

**STAPLE** this sheet to your other sheets.

1. Use synthetic division and the remainder theorem to find the indicated function value.

a)  $f(x) = x^3 - 4x^2 + x + 2$ ; find  $f(3)$ .

b)  $f(x) = -2x^4 - x^2 + x - 2$ ; find  $f(-1)$ .

c)  $f(x) = x^5 - 4x^2 + 1$ ; find  $f(2)$ .

d)  $f(x) = -x^4 - 5x^3 - x^2 + 3x + 2$ ; find  $f\left(\frac{1}{2}\right)$ .

---

2. Find the possible rational zeros of the following polynomials.

a)  $4x^3 + 5x^2 - 3x + 6$

b)  $6x^4 + 3x^2 + 4x - 15$

---

3. Solve the following polynomial equations. (We did several examples in class.)

a)  $x^3 - 4x^2 - 7x + 10 = 0$

b)  $3x^3 - 8x^2 - 8x + 8 = 0$

c)  $x^4 + 3x^3 - 20x^2 + 24x - 8 = 0$

d)  $x^4 - x^3 + 2x^2 - 4x - 8 = 0$

---

4. Use the results of the previous exercise to factor the following polynomials completely.

[NOTE: you DO NOT need to do any calculation, only use the *factor theorem*.]

a)  $x^3 - 4x^2 - 7x + 10$

b)  $3x^3 - 8x^2 - 8x + 8$

c)  $x^4 + 3x^3 - 20x^2 + 24x - 8$

d)  $x^4 - x^3 + 2x^2 - 4x - 8$

---

5. Solve the equation  $(x - 1)^2(x - 2)(x - 3)(x + 4) = 0$ .

[NOTE: you DO NOT need to do any calculation for this one; use the *factor theorem* to find the solution by just looking at the equation.]

---

6. For the following polynomials, find the end behavior, the  $y$  intercept, and the  $x$  intercepts with multiplicities. Then sketch the graph in graph paper.

a)  $f(x) = (x - 2)^2(x + 1)^3(x - 1)$

b)  $f(x) = x^3 - x^2 - 5x - 3$