

## Math 150 Week-in-Review 5 Problem Set

1. Determine the end behavior of the following polynomials.

(a)  $P(x) = 5x^8 + 6x^7 - 4x - 9$

(b)  $P(x) = -10x^{11} - 5x^6 + 5x^2 - 2$

2. Sketch graphs for the following polynomials.

(a)  $P(x) = 2x^3 - x^2 - 10x$

(b)  $P(x) = (x - 1)^2(x + 1)^3(x - 3)$

3. Use long division to find the quotient and remainder of  $\frac{2x^5 + 4x^3 - 6x + 3}{x^2 - 2x + 1}$ .

4. Use synthetic division to find the quotient and remainder when  $x^3 - 8x - 5$  is divided by  $x + 3$ .

5. Let  $P(x) = 3x^5 - 5x^4 - 38x^3 + 45x^2 - 12x - 1$ . Evaluate  $P(4)$ .

6. Show that  $x - \frac{5}{2}$  is a factor of the polynomial  $P(x) = 2x^3 - 3x^2 - 17x + 30$ .

7. Show that  $-3$  is a zero of multiplicity 2 for the polynomial  $P(x) = x^4 + 7x^3 + 13x^2 - 3x - 18$ .

8. List all possible rational zeros for the following polynomials:

(a)  $P(x) = 9x^4 - 12x^3 + 5x - 4$

(b)  $P(x) = 3x^3 - 8x^2 + 12$

9. Determine how many possible positive and negative real zeros the following polynomials have. Then determine how many imaginary zeros are possible.

(a)  $x^4 - 8x^3 + 3x^2 - 4x - 5$

(b)  $-6x^4 - 2x^3 - 9x^2 + 12x - 13$

10. Evaluate the following expressions and write in standard form.

(a)  $i^{30}$

(b)  $(5 - \sqrt{-9})(-2 + \sqrt{-12})$

(c)  $\frac{7 - 4i}{2 - 5i}$

11. Solve the equation  $3x^2 - 2x = -1$ .

12. Find ALL zeros, both real (rational/irrational) and imaginary. Then, factor the polynomial completely into linear factors with complex coefficients.

(a)  $P(x) = x^3 - x^2 - 10x - 8$

(b)  $P(x) = 3x^4 + 14x^3 + 14x^2 - 8x - 8$

(c)  $P(x) = x^5 - 4x^3 + x^2 - 4$

(d)  $P(x) = x^4 - 3x^3 + 3x^2 + x - 6$

13. Find a polynomial with integer coefficients of degree 4 with zeros 1 and  $2 + 3i$ , with 1 a zero of multiplicity 2.
14. Find the polynomial with integer coefficients of degree 3 with zeros  $-2$  and  $3i$  that has constant term 90.