

## Homework 8

Polynomial long division can be found on page 259, synthetic division on page 260 of the textbook. Please watch the instruction video posted on Canvas for more examples.

1. Use polynomial long division (for Part a, b, c, d) and synthetic division tableau (for Part a and d) to perform the following polynomial divisions. Write the polynomial in the form  $p(x) = d(x)q(x) + r(x)$ .

(a)  $(x^3 - 2x^2 - x + 1) \div (x - 1)$

(b)  $(2x^3 + 3x^2 + x - 2) \div (x^2 + 1)$

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

(d)  $(2x^3 - x^2 - 3x - 6) \div (x - 2)$

2. The following rule, called the *Rational Roots test*, is helpful in guessing roots of a polynomial:

*Consider a polynomial  $f(x) = a_nx^n + a_{n-1}x^{n-1} + \dots + a_1x + a_0$ , where the coefficients  $a_n, a_{n-1}, \dots, a_1, a_0$  are integers. If  $f(x)$  has a rational root  $x = \frac{p}{q}$  then  $p$  is a divisor of  $a_0$  and  $q$  is a divisor of  $a_n$ .*

Use the Rational Roots test to guess the roots of the following polynomials. Then factor the polynomials.

(a)  $f(x) = x^3 - 2x^2 - 5x + 6$

(b)  $f(x) = x^4 - 9x^2 - 4x + 12$

(c)  $f(x) = 12x^3 - 4x^2 - 3x + 1$