Section 2.4 (Dividing Polynomials: Remainder and Factor Theorems)

Recall that polynomial division is similar to long division with bigger numbers. You can think of the dividend as f(x), divisor as d(x), quotient as q(x), and remainder as r(x) (see online HW)

Examples: Divide

$x^2 + 14x + 45$ by $x + 9$

$(6x^3 + 13x^2 - 10x - 24) \div (3x - 4)$

q(x) =

r(x) =

q(x) =

r(x) =

$$\frac{2x^4 + 3x^3 - 7x - 10}{x^2 - 2x}$$

q(x) =

r(x) =

Remember that you can use synthetic division to divide if the divisor is of the form x – c (pg. 320).

Examples: Divide using synthetic division

$x^2 + 14x + 45$ by $x + 9$

$x^3 - 7x - 6$ by $x + 2$

Remainder Theorem: If a polynomial f(x) is divided by x – c, then the remainder is f(c)

Example: Find f(2) if $f(x) = 4x^4 + 5x^2 - 6$, then find the remainder of $(4x^4 + 5x^2 - 6) \div (x - 2)$

f(2) =

2 |

Book problems: 1,5,15,17,21,25,29,35,39,43,45

Factor Theorem: Given a polynomial function f(x)

1. If f(c) = 0 (-- c is a solution or zero of f(x) --) then x – c is a factor of f(x)
2. If x – c is a factor of f(x), then f(c) = 0

Example: Solve the equation $15x^3 + 14x^2 - 3x - 2 = 0$ given that -1 is a zero of $f(x) = 15x^3 + 14x^2 - 3x - 2$

Review HW exercises

Book problems: 1,5,15,17,21,25,29,35,39,43,45