

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Instructions:** Please complete the following problems.**Problem 1.** Divide using long division:  $(x^4 - 2x^2 + 1) \div (x^2 - 2x + 1)$ **Problem 2.** Divide using long division:  $(4x^4 + 4x^2 - x) \div (2x^2 - 1)$ **Problem 3.** Divide using synthetic division:  $(x^3 + x^2 - 13x + 2) \div (x - 2)$ **Problem 4.** Use synthetic division to factor the polynomial  $x^3 + x^2 - 2$  given that  $x = 1$  is a zero.**Problem 5.** When can you use synthetic division versus long division?**Problem 6.** Find the remainder of  $(x^3 - 3x^2 + 8x - 6) \div (x - 2)$ **Problem 7.** Is  $x - 3$  a factor of  $2x^3 - 12x - 17$ ? How do you know?**Problem 8.** Find the possible rational zeros of  $f(x) = x^{19} + 14x - 4$ **Problem 9.** Find the possible rational zeros of  $f(x) = 4x^{27} + 12x^{10} - x + 6$ .**Problem 10.** Factor  $f(x) = x^4 - x^3 - 7x^2 + x + 6$