

The assignment is due at the beginning of class on March 27, 2006.

Problem 1 (10 points) In class you saw a proof of the result that every polynomial (with real coefficients) can be written as a product of irreducible polynomials, using the *Principle of Complete Induction*. Give an alternative proof using the *Well-ordering Principle*.

Problem 2 (10 points) 1. Show that every positive integer can be written as the sum of (one or more) distinct powers of 2. (Examples: $8 = 2^3$, $25 = 2^4 + 2^3 + 2^0$.)

2. Can every positive integer be written as the sum of (one or more) distinct powers of 3?

Problem 3 (10 points) Use induction to show the following theorem: If a set has n elements, then its power set has 2^n elements.

Problem 4 (10 points) Show that the *Well-ordering Principle* implies the *Principle of Mathematical Induction*.