

ECE 3020 Homework 1
Due date: Friday September 1, 3:00 PM

1. On-line text, Problem 2.3.1d

2. In the Republic of Mathistan, cash transactions are conducted only with 5 kugel and 7 kugel bills. The president has mandated that all goods will have a minimum price of 24 kugels and all prices must be an integer number of kugels. Prove, using induction, that someone with an unlimited supply of 5 kugel and 7 kugel bills can provide the exact amount for the purchase of any item in Mathistan. You **must** use induction to prove this.

3. Use induction to prove that:

$$\sum_{i=1}^n i \binom{n}{i} = n2^{n-1}$$

You can take the following properties of the “choose function” as a given, i.e. you can use these properties without proving them:

$$\binom{a}{b} = \binom{a-1}{b-1} + \binom{a-1}{b}$$

$$\sum_{i=0}^a \binom{a}{i} = 2^a$$

Again, you **must** use proof by induction to get credit on this problem.