CECS 228 Writing Assignment 6

November 10th, 2021

Instructions

Submitting your work

Submit a single file with your solutions to the drop box by Monday, November 15th, 8:00 am. Make sure you provide your name and SID in the upper-right corner of your solution. Show all necessary steps in your solutions. Points will be lost otherwise.

Late submissions

Should you submit after the dropbox deadline, solutions received no later than 30 minutes after the deadline will lose 20% of the earned points. Solutions received after 30 minutes but before 60 minutes shall lose lose 50% of the earned points. All other late submissions will not be graded.

Problems

A. Consider the recursive-function definition $f(0) = 1$, $f(1) = 2$, and $f(n) = f(n-1)f(n-2)$ for all $n \geq 2$. Use mathematical induction to prove that $f(n)$ equals a power of two, for all $n \geq 0$.

1. Prove the basis step. (5 pts)
2. State the (strong) inductive assumption and what needs to be shown in the inductive step. (5 pts)
3. Based on your answer to 2, complete the inductive step. (10 pts)

B. A deck of 50 cards consists of number cards 1-10, where each number appears in five different suits: $\diamondsuit$, $\heartsuit$, $\spadesuit$, $\clubsuit$, and †. Consider a set of six cards from this deck, consisting of three cards numbered with x, two cards numbered with y, and one card numbered with z, where x, y, and z are three distinct numbers. How many such sets have the above described property? For example, $\{10\diamondsuit, 10\heartsuit, 10\dagger, 8\spadesuit, 8\clubsuit, 1\dagger\}$ is one such set, while $\{8\diamondsuit, 8\clubsuit, 8\dagger, 10\spadesuit, 10\diamondsuit, 9\dagger\}$ is another. What counting rule(s) are you using and why? (10 pts)