Discrete Math, Semester 2019-2020-1, Quiz 2

Student ID:_____ Name:_____

2019/11/1

1. Consider the nonhomogeneous linear recurrence relation $a_n = 2a_{n-1} + 2^n$
a) Show that $a_n = n2^n$ is a solution of this recurrence relation. (0.5 points)

b) Find all solutions of this recurrence relation. (1 points)

c) Find the solution with $a_0 = 2$.(0.5 points)

2. Find a recurrence relation (including the initial conditions) for the number of ways to climb n stairs if the person climbing the stairs can take one stair or two stairs at a time. (2 points)

3. For the set $\{a, b, c, d, e, f\}$, what's the next larger permutation of $cdabfe$? (1 points) What's the next larger 3-combination of bcf? (1 points)

4. How many solutions are there to the inequality
$x_1 + x_2 + x_3 \leq 11$,
where x_1, x_2, x_3 are nonnegative integers? [Hint: Introduce an auxiliary variable x_4 such that $x_1 + x_2 + x_3 + x_4 = 11$.] (2 points)

5. How many strings of four decimal digits
a) do not contain the same digit twice? (0.5 points)

b) end with an even digit? (0.5 points)

c) have exactly three digits that are 9s? (1 points)