Ma2201/CS2022
Quiz 0001

Discrete Mathematics

D Term, 2018

PRINT NAME: _____

SIGN: _____

1. (4 pts) A PIN for the website *pleasesendmemorespam.com* consists of 7 digits with the conditions that the first digit must be 0 or a 5, the second digit must be odd, the third and fourth digits must be the same, and the last digit must be exactly one more than the previous one. So, for example, 0111112 is legal.

How many legal PINS are there?

a) $10^5 \cdot 9$ c) $10^3 \cdot 9^2$

b) $10^4 \cdot 9^2$ d) $10^3 \cdot 9$.

Choice d. The first two choices for the first two digits are 2 and 5. The third and forth digits are a single choice amongst 10. The 5th digit is 10 all by itself. And the last two digits are there are 9 choices, 0–8 for the sixth digit, and the the seventh is then forced. So $2 \cdot 5 \cdot 10 \cdot 10 \cdot 9 = 10^3 \cdot 9$.

2. (2 pts) For each of the following circle the object which is more discrete and state briefly why.

a) Sphere Cube

b) Checkers Tennis

a) The cube, as we know from dice, can sit on one of six sides. The sphere rolls.

b) Checkers. In tennis, the play of the game follows a discrete list of rules, and the scoring is discrete, but each actual play is continuous. There are, for example, a continuous variety of serves.

In checkers, even the play of the game is discrete, with only a finite number of moves possible any any point.

3. (4 pts) A species of fruit fly has three variations in eye color, red, blue or green, 3 variations in leg length, short, medium and long, and 3 variations in abdomen shape, round, barrel and clumsy. Circle each of the conditions below which would allow a biologist to conclude that the three aspects are *not* independent for the purposes of the multiplicative principle. (More than one may apply.)

a) 4/9 of the flies have green eyes.

b) 5/9 of the flies are green eyed, long legged and clumsy.

c) 8/9 of the clumsy flies have green eyes.

d) 9/9 of the clumsy flies have green eyes.

Only 9 should be chosen. The multiplicative principle would imply that there are $3^3 = 27$ types of this species of fruit fly. It does not concern itself with how likely each type is. Only condition d would remove a type of fly from existence.