**CSC 1500 – Homework 4**

**(1)** List the Big-Oh notation that corresponds to each of the following examples. Afterwards, list them by the order of complexity from LEAST to MOST (*5 pts. each identification, 20 pts for correct order*)

(1.1) A bacteria that doubles itself every generation N.

Polynomial – the number of bacteria n doubles, which means the next generation will comprise of n\*n (one for one) number of bacteria.

(1.2) Following a single path along a branching story with N choices that change the story until you reach an ending.

Logarithmic - the number of possible paths decreases as the paths are traversed.

(1.3) Pulling a single ball out of a pit filled with N balls.

Constant – the pit is always filled with balls, the number of balls does not change the likelihood of drawing the ball from a pit filled with balls.

(1.4) Searching the N rooms in a house for your keys.

Linear – the search time scales linearly with each number of rooms.

(1.5) Trying to route a band’s world tour through N cities with the shortest mileage possible.

Factorial – traveling salesman requires calculation of all other routes in order to determine shortest route.

(1.6) Considering all possible outcomes to a game of chess with the N remaining moves, and picking the best outcome.

Exponential – each move only has so many moves descending from it.

ORDER:

Constant (Ball), Logarithmic (branching story), Linear (Searching rooms), Polynomial (bacteria), Exponential (chess), Factorial (traveling salesman).

**(2)** Put the following in order of complexity from lowest to highest. (*50 pts.*)

(2.1) 5n

(2.2) (2/3)n

(2.3) (3/2)n

(2.4) 2nLog(n)

(2.5) n3

(2.6) 2000

(2.7) 3Log(n)

(2.8) n2

(2.9) 2n

(2.10) 1

ANSWER:

(2.10) 1

(2.6) 2000

(2.7) 3Log(n)

(2.3) (3/2)n

(2.9) 2n

(2.1) 5n

(2.4) 2nLog(n)

(2.8) n2

(2.5) n3

(2.2) (2/3)n