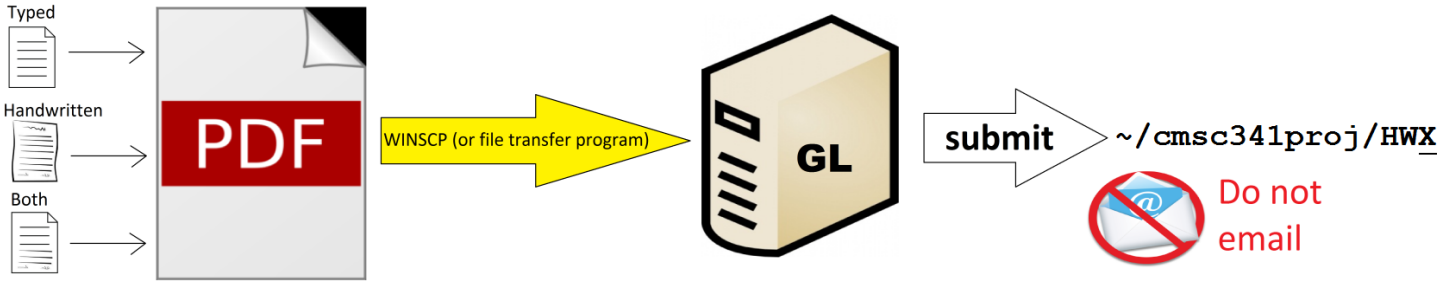
CMSC 341 Homework 2 – Version A

Proof by Induction and Code Complexity

Name:
Section:
HW #:
Version:
Username:



To see how this is done, watch the video here.

It is HIGHLY suggested that this is completed by ***typing*** your answer. If you submit this on paper, PLEASE write clearly. The grader WILL not guess what your intention or answer was. This assignment ***MUST*** be PRINTED and given to YOUR instructor BEFORE the due date. If you do not have class on the day due, you must take that into consideration.

Proof by Induction

You must show ALL work to be given credit. (Think of it as proving to us you know how to do this!!)

#1 $2^n > n^2$ for every positive integer n when n >= 5

#2 $4^n - 1 = 3k$ (k is legit and not "n". This results of this equation will always be divisible by 3)

#3 $\frac{1}{1*2} + \ldots + \frac{1}{n(n+1)} = \frac{n}{n+1}$

Code Complexity

Identify the unit count for each portion of the code given below to identify the overall Big Oh speed. Use the example below as a template for your answer, or some classes may use summations. **The table answers below are NOT correct!! But the overall setup is. Partial credit will be given if some portion of the work shown is correct.**

Code	Cost	# of Times	Total
	-	-	
`int sum1(int N)`	1	1	1
`{`	-	-	
`  int s = 0;`	1	1	1
`  for(int i = 1; i <= N; i++)`	1 (int i) + 1 (<=) + 1 (++)	1 + 2(n + 1)	2n + 3
`  {`	-	-	
`    s = s + i;`	2	n	2n
`  }`	-	-	
	-	-	
`  return s;`	1	1	1
`}`	-	-	
Final			4n + 6
			O(n)

#4

```
sum = 0;
for ( i = 0; i < n; i++ )
      for (j = 0; j < n; j++ )
            ++sum;
```

#5

```
sum = 0;
for( i = 0; i < n; i += 2 )
      for( j = 0; j < n; j++ )
            ++sum;
```

#6

```
sum = 0;
for( i = 1; i < n; i *= 2 )
      for( j = 0; j < n; j++ )
            ++sum;
```

#7

```
sum = 0;
for( i = 0; i < n; i++ )
      for( j = 0; j < i * i; j++ )
            for ( k = 0; k < j; k++ )
                  ++sum;
```

Please write your username, instructor and version on your answer sheet!!!