CSE 101
Winter 2022
Quiz 3 **Solutions**

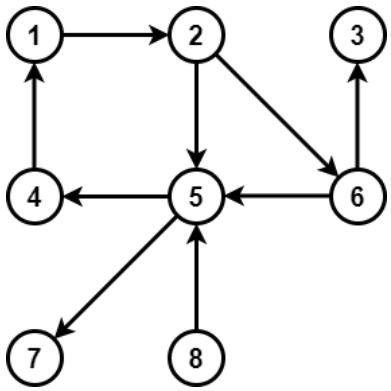
1. (25 Points) Rank the following functions from lowest to highest asymptotic growth rate.

   1) n
   2) $n\sqrt{n}$
   3) 2^n
   4) $2^{\ln(n)}$
   5) $\sqrt{n}$
   6) $n\ln(n)$
   7) n^2
   8) $\ln(n^2)$
   9) ln(ln(n))

   Write your answer as a permutation of the set $\{1,2,3,4,5,6,7,8,9\}$, giving the corresponding line numbers of the above functions in the required order (left to right, slowest growing function to fastest growing function.) No justifications are required.

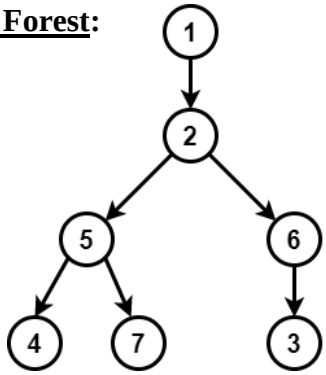
   Solution: 9 8 5 4 1 6 2 7 3

2. (25 Points) Run the DFS algorithm on the digraph pictured below. Process vertices in the main loop of DFS() by increasing vertex label. Process vertices in the for loop of Visit() by increasing vertex label. As vertices finish, push them onto a stack. Fill in the table below giving the adjacency list representation, discover times, finish times and parents in the DFS forest. Draw the resulting DFS forest, and show the state of the stack when the algorithm is complete.



vertex	*adj*	*discover*	*finish*	*parent*
1	**2**	**1**	**14**	**nil**
2	**5 6**	**2**	**13**	**1**
3		**10**	**11**	**6**
4	**1**	**4**	**5**	**5**
5	**4 7**	**3**	**8**	**2**
6	**3 5**	**9**	**12**	**2**
7		**6**	**7**	**5**
8	**5**	**15**	**16**	**nil**

DFS Forest:



Stack:
8
1
2
6
3
5
7
4