1 Morning section

Problem 1

1. true;
2. true;
3. false;
4. false; counterexample: $h(n) = n, f(n) = n^2, g(n) = n^3$;
5. false.

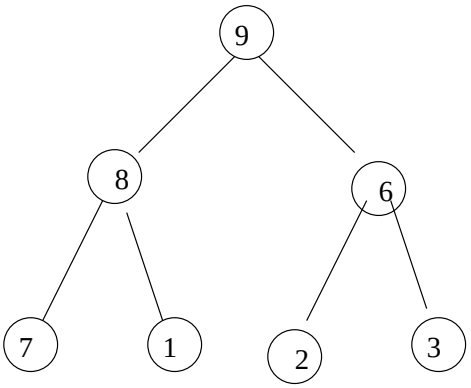
Problem 2

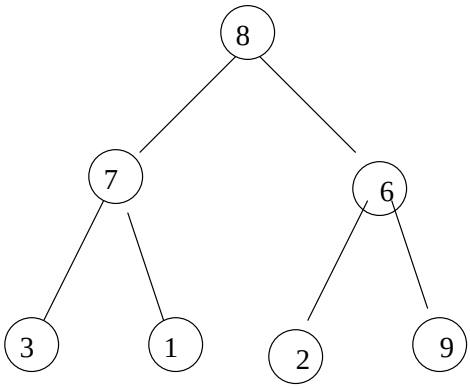
1. true;
2. false; counterexample: $n = 6$. Correct would be C_1 implies C_2;
3. false; counterexample: $n = 12$. Correct would be C_2 and C_3 are necessary conditions for C_1.

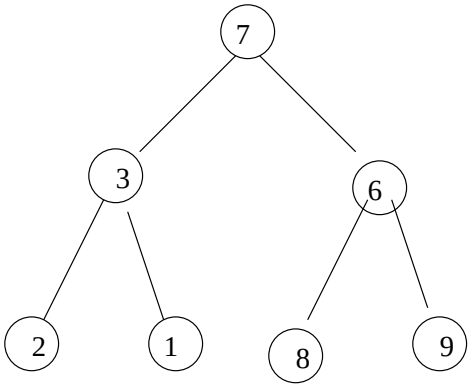
Problem 3 The classes of functions are separated by "—":

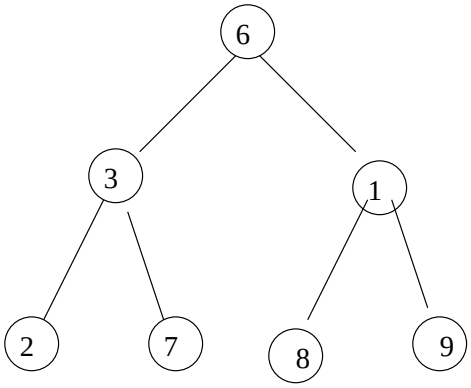
$$f_4, f_9 | f_1 0 | f_3, f_8 | f_1 | f_2 | f_5 | f_6 | f_7$$

Problem 4 The sequence of heaps is as follows:


9
8
6
7
1
2
3


8
7
6
3
1
2
9


7
3
6
2
1
8
9


6
3
1
2
7
8
9

Problem 5 If $t = 1$ then the chance of being wrong is 66%. If $t = 2$ then the chance of both being wrong is $(66\%)^2$. In general, the chance of success is $1 - (66\%)^t$. Then:

$1 - (66\%)^t = 88\%$ which implies $t = log(12\%)/log(66\%)$ (the boundary condition). The solution is any $t \geq log(12\%)/log(66\%)$.

Problem 6 The tables are presented. d_{ij} is on the left and p_{ij} is on the right.

	1	2	3	4	5
1	0	1			
2		0	2		
3			0	3	
4				0	4
5	5				0

	1	2	3	4	5
1	1	2	3	4	5
2	1	2	3	4	5
3	1	2	3	4	5
4	1	2	3	4	5
5	1	2	3	4	5

	1	2	3	4	5
1	1	3	6		
2		0	2	5	
3			0	3	
4				0	4
5	5	6	8	11	0

	1	2	3	4	5
1	1	2	2	2	5
2	1	2	3	3	5
3	1	2	3	4	5
4	1	2	3	4	5
5	1	1	1	1	5

Problem 10 Define: $F(k) = Max\{F(k-1), F(k-2) + a_k\}$