Analysis of Algorithms - Assignment 6

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1 Section 6.4

1.1 No. 2

1. For i = 1,2...n/2, check $A(i) >= max(A(2i), A(2i + 1))$. If not true, it's not a heap. Since the algorithm makes 2(n/2) compares, it's efficiency is in O(n).

1.2 No. 7

1. No

2 Section 6.5

2.1 No. 4

1. See attached paper

2.2 No. 7

1. See attached paper

2.3 No. 8

1. See attached paper

3 RSA Encryption

See paper

4 Section 8.1

4.1 No. 2

1. See figure 8.1 in the book

4.2 No. 12

1. We set the probability of A winning a series to P(a,b), where a is how many more games A needs and b how many more games B needs. If A wins (probability p), they need a-1 more wins while B still needs b wins. If A looses (probability q = 1 - p), A still needs a wins and B needs b - 1 wins. This leads to recurrence
   P(a,b) = pP(a - 1, b) + qP(a,b - 1) for a,b > 0
   with initial condition
   P(0,b) = 1 for b > 0 and P(a,0) = 0 for a > 0.

2. See attached paper