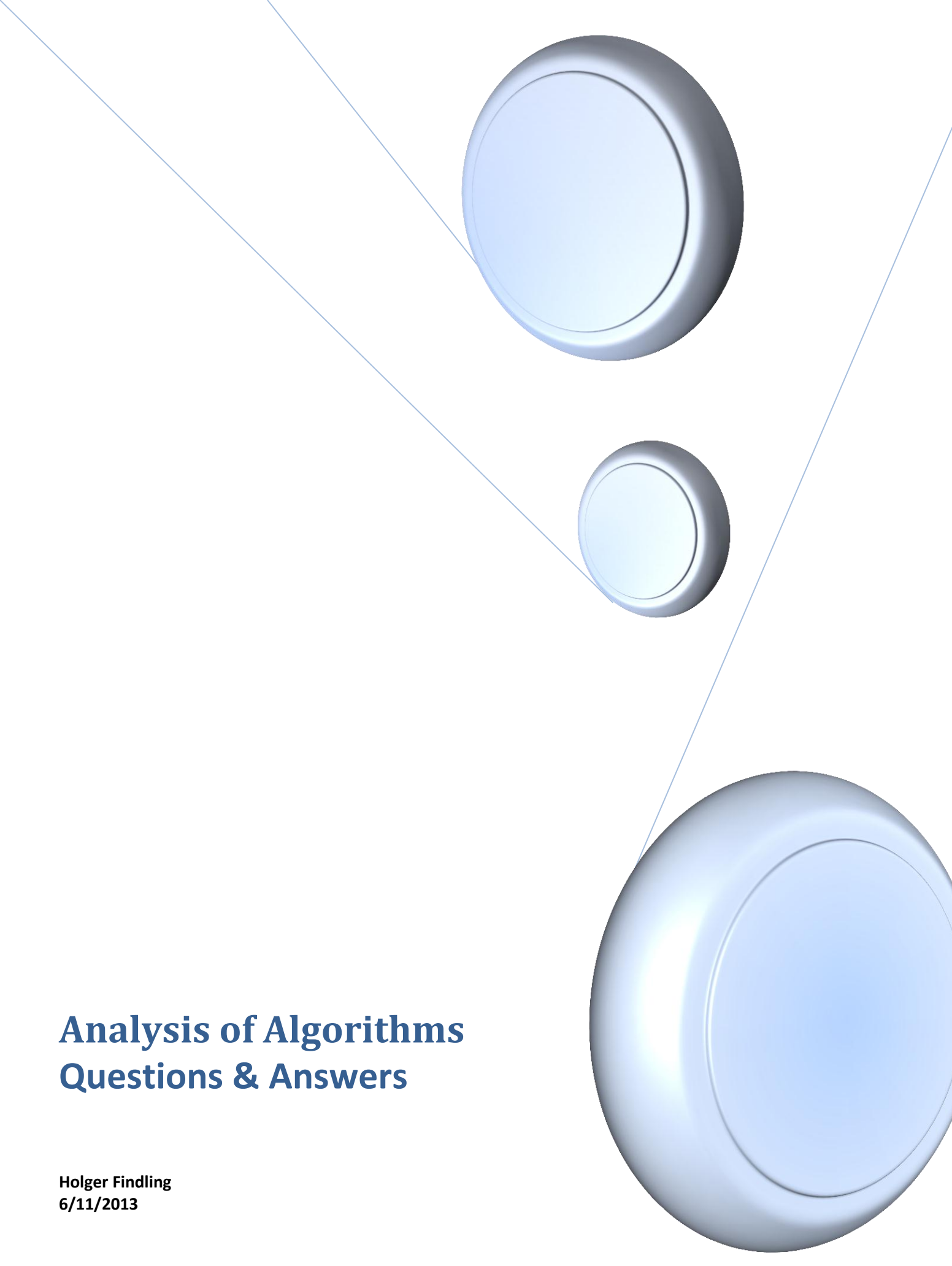

Analysis of Algorithms
Questions & Answers

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Problem 1

What are the main differences between Analysis of Algorithms and Complexity Theory?
Is there a relationship between the two topics?
How does either topic help in the design and development of algorithms?

Problem 2

Besides merely being a finite set of rules that gives a sequence of operations for solving a specific type of problem, an algorithm has five important features. List the five features and provide a short explanation.

Problem 3

Suppose an array contains the following data: 5, 4, 7, 3, 2
Using the bubble sort algorithm, show the data in the array completing the first iteration through the outside loop.

Problem 4

Suppose an array contains the following data: 5, 4, 7, 3, 2
Using the selection sort algorithm, show the data in the array completing the first iteration through the outside loop.

Problem 5

Suppose an array contains the following data: 5, 4, 7, 3, 2
Using the insertion sort algorithm, show the data in the array completing the first iteration through the outside loop.

Problem 6

Show that $g(n) \varepsilon O(f(n))$
Where

$g(n) = 2n^2 + 2n + 3$

$f(n) = 2n^3 + 2n + 3$

Problem 7

Provide the terms of the sequence where n = 7 and p = 2

$$\sum_{k=1}^{n+p} k$$

Problem 8

Modify the Summation such that k = 0

$$\sum_{k=4}^{10} (5k - 2)$$

Problem 9

Solve for S (n)

$$S(n) = \sum_{k=1}^{n} (k + 3)$$

Problem 10

Perform a worst case analysis on the code snippet below.

```
const int  n = 100;
int i = 0;
int x[n];
while (true) {
      if (i < n)
            x[i] = i++;
      else
            return;
}
```

Problem 11

Perform a worst case analysis on the code snippet below.
What are the values of x after the code executed, for n = 2 through 10?

```
int x = 0;
for (i = 0; i < n; i++) {
    for (j = 0; j < n; j++) {
      x += 1;
}}
```

Problem 12
Show the first 7 terms of the recurrence equation T (n) = T (n-3) + T (n- 2) + 2

1	2	3				

Problem 13

Perform a worst case analysis on the code snippet below.
What are the values of x after the code executed, for n = 2 through 10?

```
int x = 0;
for (i = 0; i < n; i++) {
    for (j = i;  j < n; j++) {
     x += j;
}}
```

Problem 14
Provide the Time equation T (n).
Do not solve.

```
double Factorial (int n)
{
     if (n > 1)
          return (n * Factorial (n –1);
     return 1;
}
```

Problem 15
Using the expansion method solve T (n) = 3 T (n/3) + 3n for bigO.
Show all of your work!