Problem Set 1

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Ch. 1 10) a) 1. $I = 32$ $J = 20$

2. $\frac{32}{20}$ $R = 12$,

3. $I = 20$, $J = 12$

2. $\frac{20}{12}$, $R = 8$

3. $I = 12$ $J = 8$

2. $\frac{12}{8}$, $R = 4$

3. $I = 8$, $J = 4$

2. $\frac{8}{4}$, $R = 0$ $\Rightarrow$ $\boxed{J = 4}$

b. 1. $I = 32$ $J = 0$

2. $\frac{32}{0}$ ← The output of $\frac{I}{J}$ is indeterminate, so the algorithm can't continue without an R value

Amended Algorithm

3. If the result of I/J is indeterminate, Print "Any number divided by 0 is indeterminate.

11) There are 26! possible combinations, which is = 1.5×10^{25}, and if the computer can analyze 10 million paths per second, it would take 1.6×10^{17} seconds. This isn't a productive algorithm because it would take years to produce the answer.

1. If the remainder of $\frac{N}{2}, \frac{N}{3}, \frac{N}{5}, \frac{N}{7}$ or $\frac{N}{11} = 0$
   Print "The number is not prime"
2. Else, Print "The number is prime"

Ch. 2 20)
1. Get N
2. If $\frac{N}{2}$ or $\frac{N}{3}$ or $\frac{N}{5}$ or $\frac{N}{7}$ or $\frac{N}{11} = 0$
3. Print "The number is not Prime
4. else
5. Print "The number is Prime"

23)
1. Recieve list input of K values, and SUM values.
2. For every index in the list, check if the index being checked (+) the other index is equal to SUM.
3. Once every index has been checked, is a pair is found, Print the first index of the adding values, and the second index of the values
4. If no pair is found, return "Sorry, there is no such pair of values"

24)
1. Set the value as parts = 0
2. Set the value of total = 0
3. While V ∠0
4. total + V = total
5. Add 1 to parts
6. Set the next value in the list for V
7. End loop
8. If parts ≠ 0
9. set average = $\frac{\text{total}}{\text{parts}}$
10. Return the value of average
11. else
12. Output "There is no input"

ABC DEFGH

Ch. 3 11) a) 4, 8, 2, 6
1. n=4
2. V=4
3 C=2
4, 2, 8, 6
2, 4, 8, 6
2, 4, 6, 8

b) 12, 3, 6, 8, 2, 5, 7
3, 12, 6, 8, 2, 5
3, 6, 12, 8, 2, 5
3, 6, 8, 12, 2, 5
3, 6, 8, 2, 12, 5
3, 6, 8, 2, 5, 12
3, 6, 2, 8, 5, 12
3, 6, 2, 5, 8, 12
3, 2, 6, 5, 8, 12
2, 3, 6, 5, 8, 12
2, 3, 5, 6, 8, 12

c) D, B, G, F, A, C, E, H
D, B, F, G, A, C, E, H
D, B, F, A, G, C, E, H
D, B, F, A, C, G, E, H
D, B, A, F, C, G, E, H
D, B, A, C, F, G, E, H
D, B, A, C, F, E, G, H
D, A, B, C, F, E, G, H
D, A, B, C, E, F, G, H
A, D, B, C, E, F, G, H
A, B, D, C, E, F, G, H
A, B, C, D, E, F, G, H

Two different answers depending on how you index it???
* Index from 0 vs. index from 1

25) a. John and Elsa
b. John, Lee, Snyder, Tracy
c. John, Elsa, and Joanne

33) $P \cdot N = \frac{n(n-1)}{2} + P(\lfloor \log_2 N \rfloor + 1)$

$P \cdot 10{,}000 = 49995000 + P(\lfloor \log_2 10000 \rfloor + 1)$

$10{,}000P = 49995000 + P(14)$

$9986P = 49995000$

$P = 5006$

5006 searches must be done before binary search is more efficient

- Selection sort => $\frac{n(n-1)}{2}$
  - Needed to do binary search
- Binary Search must be a sorted list
- Sequential Search goes through every element in the list
- floor means take the lower #