CST 370 – Homework 1
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1. The tree shown on the pdf is indeed a binary tree. This is true because each node has two child nodes. However, it is NOT a binary search tree. In order for this tree to be a binary search tree, the left child node must have a value less than the parent and the right must be greater. The tree given fails to meet this criteria at parent node “40” where its left child node is “60”, a value greater than 40.

2.a) Find gcd(270, 192) via Euclid’s algorithm:

gcd(270,192) = gcd(192, 270 % 192) → gcd(192, 78)

gcd(192, 78) = gcd(78, 192 % 78) → gcd(78, 36)

gcd(78, 36) = gcd(36, 78 % 36) → gcd(36, 6)

gcd(36, 6) = gcd(6, 36 % 6) → **gcd(6, 0)**

b) Find gcd(270, 192) via middle school approach

270 → 2 * 3 * 3 * 3 * 5

192 → 2 * 2 * 2 * 2 * 2 * 2 * 2 *3

common factors: 2, 3

gcd = 2 * 3 = **6**

3. This algorithm takes some A of length n, assigns two variables the value of the first element of the array, then iterates through the array and overwrites the value of either “num1” if the current element is less than the current value of “num1” OR “num2” if the current element is greater than the current value of “num2”. Finally, it computes the difference of the two numbers.

The final result is the distance between the largest number and the smallest number or in other words, this algorithm finds the **range** of the array.

4.a) Given A[] = {40, 50, 10}, applying the algorithm gives the following results:
A = {40, 50, 10}
S = {10, 40, 50}
C = {1, 2, 0}

b) Given A[] = {60, 10, 60, 10, 20, 50}, applying the algorithm gives the following results:
A = {60, 10, 60, 10, 20, 50}
S = {10, 10, 20, 50, 60, 60}
C = {5, 1, 4, 0, 2, 3}