

1.

$2/n$
37
$\text{Sqrt}(n)$
N
$n\log(\log(n))$
$N\log n$
$n\log^2 n$
$n^{1.5}$
N^2
$N^2 \log(n)$
$2^{n/2}$
2^n

2. a. $\frac{x}{35} = \frac{100}{20} = \mathbf{175 \text{ seconds}}$

b. It will also be 175 seconds because when simplified it equals the same as $O(N)$

c. $\frac{x}{35} = \left(\frac{100}{20}\right)^3 = \mathbf{4375 \text{ seconds}}$

d. $\frac{x}{35} = \left(\frac{2^{100}}{2^{20}}\right) = \mathbf{35 * 2^{80} \text{ seconds}}$

3. $(3^{5+1} - 1)/2 = \mathbf{364 \text{ nodes}}$

```
68 class Node
69 {
70 public:
71     Node* right;
72     Node* left;
73 };
74
75 int height(Node* node)
76 {
77     int r = 0, l = 0;
78     if (node == NULL)
79         return 0;
80     else
81     {
82         if (node->left != nullptr)
83         {
84             height(node->left);
85             l++;
86         }
87
88         if (node->right != nullptr)
89         {
90             height(node->right);
91             r++;
92         }
93         if (l > r)
94             return l;
95         else if (l < r)
96             return r;
97         else
98             return r;
99     }
100 }
101
102 }
```

4.

5.

```
void fib(int n)
{
    int x = 0, y = 1, next = 0;
    for (int i = 1; i < n; ++i)
    {
        if (i == 1)
            cout << x << endl;
        if (i == 2)
            cout << y << endl;
        next = x + y;
        x = y;
        y = next;

        cout << next << endl;
    }
}
```

Some pros of recursion is it can add clarity to code and reduce time complexity but some cons are it can use more memory compared to using iteration.

6. Git is an opensource website where people can create repositories and save/share their work. It allows the user to access all files, branches, folders of a project. It can be used to share your work whether it is for school, work, or personal projects.

7. The linux tool gbd is a debugger tool that runs on many systems and can be used for many program languages such as C, C++, C sharp, and more. Cmake can be used for cross-platform usage of system libraries. It will recognize which type of compiler to use depending on the source it is given. Make is a tool that carries out the executable of the programs source files. The make needs to know how to build the program, so it needs to be given a makefile so that it will run your code.

8. Argc would get set to the number of words being passed into main while argv would hold the words. For example if “Hello World” was passed in argv[0] would be Hello and argv[1] would be World.