# 159.240 STL Vector Tutorial

Don't hand in this program.

In Linear Algebra, a vector is basically an (x,y) coordinate. When we're talking about C++, a vector is a powerful array from the C++ Standard Template Library (STL), which is a feature of C++. It can grow as needed and you can use it just like an array. You can also use it to store anything, because it is a “templated container”. This means you can change it from int to char to anything you like.

1. Copy the following program, test it and make sure it works.

```
#include <vector>
#include <stdio.h>

using namespace std;

int main() {
    vector<int> v;

    v.push_back(1);
    v.push_back(1);
    v.push_back(2);
    v.push_back(3);
    v.push_back(5);
    v.push_back(8);

    for (auto it = v.begin(); it < v.end(); ++it) {
        printf("%d\n", *it);
    }
}
```

2. Change the vector so that it stores characters instead of integers.

3. Change the push_back() functions to `'a', 'b', 'c', 'd', 'e', 'f'` instead of `1, 1, 2, 3, 5, 8`

4. Change the printf to print %c instead of %d. Run the program again and test it.

5. At the top of your program, implement a struct like this:

```
struct agent {
   int x, y;
};
```

6. Change the vector so that it stores agent pointers like this:

```
vector<agent*> v;
```

7. Now allocate a few agents by using the `new` keyword, and add them to the vector like this:

```
agent* a = new agent;
a->x = 10; a->y = 12;
v.push_back(a);
v.push_back(new agent);
```