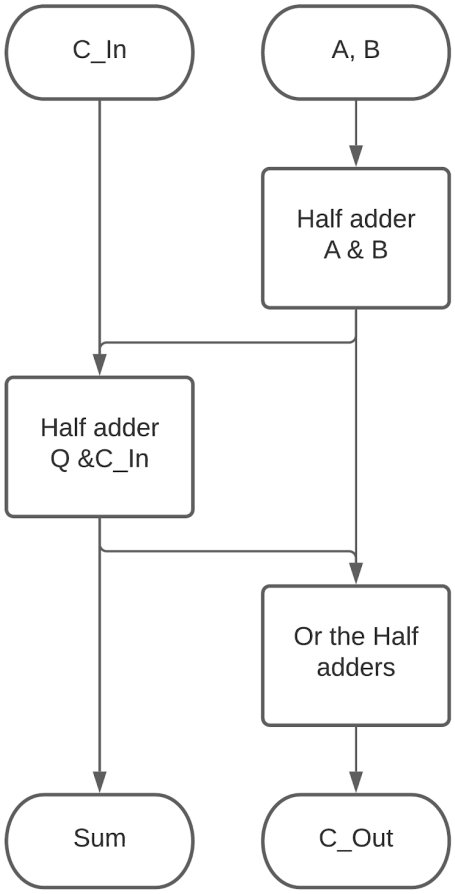
Digital Objects

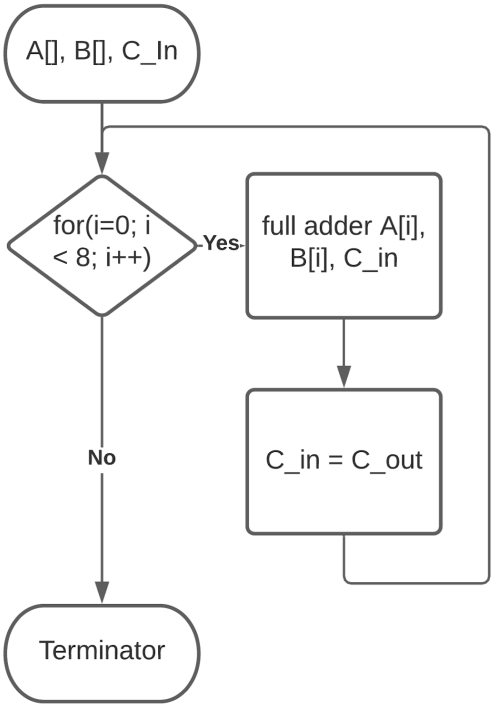
Preparation - 02/03/21

1) Describe the overall structure of your program.

My program calls the full adder once each time for the size of the register, currently set at 8. This full adder calls the half adder twice, and uses an OR gate on the c_outs. The half adder uses the AND and XOR functions.



Full Adder



8-bit ripple counter

My modified programs will use class based operations to solve the AND, OR, and XOR operations. This is because they have similar structures so can be initialised easily as derived classes.

2) Define your gate classes using inheritance including any destructors you might need.

```
class gate
{
public:
    gate() = default;
    gate(bool in_A, bool in_B)
    {
        A = in_A;
        B = in_B;
        Q = 0;
    }
    bool op()
    {
        return Q;
    }

private:
    bool A;
    bool B;
    bool Q;
};

class AND : public gate
{
public:
    AND() = default;
    AND(bool in_A, bool in_B)
    {
        A = in_A;
        B = in_B;
        Q = in_A && in_B;
    }

private:
    bool A;
    bool B;
    bool Q;
};
```

```
class OR : public gate
{
public:
    OR() = default;
    OR(bool in_A, bool in_B)
    {
        A = in_A;
        B = in_B;
        Q = in_A || in_B;
    }

private:
    bool A;
    bool B;
    bool Q;
};
class XOR : public gate
{
public:
    XOR() = default;
    XOR(bool in_A, bool in_B)
    {
        A = in_A;
        B = in_B;
        Q = in_A ^ in_B;
    }

private:
    bool A;
    bool B;
    bool Q;
};
```

3) In general when should you use delete and delete[]

The delete[] operator is used to delete arrays, so should be used on arrays and when pointers are being used. The delete function should be used by default in any other instance.