(2) [5+10=15 points]
Here is the code for a base-b counter. (For this entire problem, you get to assume that $b \geq 2$.)

```
class Counter {
  private:
    int n;
    int b;
    int *p;
  public:
    Counter (int b, int n) {
       this->n = n;  this->b = b;
       p = new int [n];
       for (int i = 0; i < n; i ++) p[i] = 0;
    }
    void increment () {
       int i;
       for (i = 0; i < n && p[i] == b-1; i ++)
           p[i] = 0;
       p[i] ++;
   }
}
int main() {
  int n;
  cin >> n;
  Counter c(2, n);
  for (int i = 0; i < pow(2, n); i++) c.increment();
  return 0;
}
```

(a) Analyze the **worst**-case runtime of `increment()` in terms of `n` using Θ-notation, and explain your answer.

(b) Analyze the **worst**-case runtime of `main()` in terms of `n` using Θ-notation, and explain your answer. **Hint:** figure out how much work is spent changing p[0], p[1], etc, and sum these values together.