2) (10 pts) ANL (Summations and Algorithm Analysis)

Give the Big-Oh runtimes for each of the following functions in terms of *n* and/or *k* (where *k* is the length of string *s*), given that *strlen*(*s*) is an O(*k*) function and *toupper*(*c*) is an O(1) function. You may assume that *s* is non-NULL and contains at least one character. No justifications necessary, only answers will be graded.

```
void uppercase(char *s)
{
   int i;
   for (i = 0; i < strlen(s); i++)
      s[i] = toupper(i);
}
```

uppercase run time: _____

```
void uppercase_remix(char *s)
{
   int i, length = strlen(s);
   for (i = 0; i < length; i++)
      s[i] = toupper(i);
}
```

uppercase_remix run time: _____

```
void uppercase_unreliable(char *s)
{
   int i = 0, j = strlen(s) - 1, m;

   while (i <= j)
   {
      m = i + (j - i) / 2;
      if (rand() % 2 == 0)
      {
         s[i] = toupper(s[i]);
         i = m + 1;
      }
      else
      {
         s[j] = toupper(s[j]);
         j = m - 1;
      }
   }
}
```

uppercase_unreliable run time: _____

```
void mad_scramble(char *s, int n)
{
   int i;
   for (i = 0; i < n; i++)
      s[strlen(s) - 1] = rand() % 25 + 'a';
}
```

mad_scrable run time: _____