Consider the function, `useless`:

```plaintext
1: function useless(n)
2: if n = 1 then
3:     return 1
4: else
5:     return useless(random(1, n))
6: end if
7: endfunction
```

where `random(1, n)` returns a uniformly distributed random integer in the range $1 \ldots n$.

Assume an initial call `useless(m)`.

1. What value is returned? Prove your answer formally.
2. Calculate exactly the expected number of calls to `random` in line 5.
3. In the worst case, what is the number of calls to `random` in line 5?