

- c) (8 points) To slow down the hacker you make your website wait 2^n seconds before responding to a login request, where n is the number of times a visitor has incorrectly guessed their password. If the hacker has a $1/1000$ chance of correctly guessing a password on each attempt, what is the expected amount of time it will take the hacker to crack a user's password.

$X = \{ \text{the failed trail before the hacker get the password} \}$

$$P\{X=n\} = (1-p)^n p$$

$$E[X] = \sum_{i=0}^{\infty} 2^n (1-p)^n p$$

$$= \sum_{i=0}^{\infty} (2-2p)^n p$$

Since $p = \frac{1}{1000}$

$$E[X] = \infty$$

The strategy used in part (d) is a great password protection algorithm.