Expected Time vs Amortized Time

$1 + \frac{1}{6}$

```
int roll5()
{
  int roll;
  do
  {
    roll = roll6();
  } while (roll == 5);
  return roll;
}
```

X = number of calls to roll6 in a call to roll5

$$E[X] = \frac{5}{6}\cdot 1 + \frac{1}{6}\cdot\frac{5}{6}\cdot 2 + \frac{1}{6}\cdot\frac{1}{6}\cdot\frac{5}{6}\cdot 3 + \left(\frac{1}{6}\right)^3\cdot\frac{5}{6}\cdot 4 + \cdots = \frac{6}{5}$$

$O(1)$ expected time

P(n calls to roll 5 take > 2n calls to roll 6) ↓ as n ↑, but > 0

P(n calls to roll 5 take > 10n calls to roll 6) > 0

P(n calls to roll 5 take > n^2 calls to roll 6) > 0

expected # roll6's total over n roll5's is n · 1.2 $\Theta(n)$

P(n consecutive adds require > 4n copies) = 0

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