20201021-p8133_probset4_jsg2145

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Given: Pr(toxicity at dose level 1) = 0.25

Definition: The MTD means that 2/3 or 2/6 participants experience toxicity.

If the first 3 have no instances of toxicity, then there is no MTD.

If the first 3 have 1 instance of toxicity, then 3 more participants are recruited.

If the first 3 have 2 instances of toxicity, then the MTD is reached.

```
pr_tox1 = dbinom(1, 3, 0.25)
pr_tox1
```

```
## [1] 0.421875
```

There is a 0.421875 probability that 3 more participants will be recruited.

$Pr(X_2 \geq 2|X_1 = 1) = Pr(X_1 = 1) \cap Pr(X_2 = 1, 2, or 3)$

```
pr_tox3 = 1 - dbinom(0, 3, 0.25)
pr_tox3
```

```
## [1] 0.578125
```

```
pr_toxc= pr_tox1*pr_tox3
```

There is a 0.2438965 probability that the MTD will be reached if there is 1 toxicity response in the first 3.

```
pr_tox2 = dbinom(2, 3, 0.25)
pr_tox2
```

```
## [1] 0.140625
```

There is a 0.140625 probability that the MTD will be reached in the first 3 participants.

So, there is 1 - (0.2438965 + 0.140625) probability that the dose level 1 will not reach the MTD.

1 - (0.2438965 + 0.140625) = 0.6154785