Free Throw Success Probability: LeBron James

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Khan Academy Video - English

Ten free throws in a row "LeBron James"

If LeBron James has a lifetime successful free throw percentage of 75%, what is the probability that he will make 10 in a row, assuming that each attempt is an indepedent event?

Theoretical P(10 in a row) = (75%)^10 = (75/100)^10 = 0.75^10 = 0.056 = 5.6 %

Use the binomial theorem for the same result

```
round(dbinom(10, size=10, prob=0.75),3)
```

```
## [1] 0.056
```

Simulate shooting 10 free throws 1,000 times

```
n <- 1000
trial <- NULL
for (i in 1:n) {
       trial = rbind(trial,t(as.matrix(rbinom(10,1,0.75))))
}
trial <- data.frame(trial)
attach(trial)
Successes_1 <- X1+X2+X3+X4+X5+X6+X7+X8+X9+X10
detach(trial)
head(Successes_1)
```

```
## [1]  9  9  7  7  8 10
```

```
# Here is more elegant and efficient code
Successes_2 <- apply(trial,1,sum)
Successes_2 <- data.frame(Successes_2)
head(Successes_2)
```

```
##   Successes_2
## 1           9
## 2           9
## 3           7
```

```
## 4           7
## 5           8
## 6          10
```

```
Ten_out_of_ten <- ifelse(Successes_2$Successes_2 == 10, 1,0)
P_Ten_out_of_ten <- sum(Ten_out_of_ten)
options(digits=4)
P_Ten_out_of_ten <- P_Ten_out_of_ten / n
P_Ten_out_of_ten <- (P_Ten_out_of_ten * 100)
paste("Experimental probability of 10 of 10 free throws =",P_Ten_out_of_ten,"%")
```

```
## [1] "Experimental probability of 10 of 10 free throws = 6.4 %"
```

Given that Sal has a probability of 0.000003 of getting 10 out of 10, what is his lifetime successful free throw percentage?

```
options(digits = 2)
Theoretical_percentage = 0.000003^(1/10) * 100
Theoretical_percentage
```

```
## [1] 28
```


LEBRON JAMES
DREAM BIG
EDITION