Binomial Distribution Exercises

Arin Parsa

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OpenIntro Statistics 4th edition, Section 4.3 exercises

4.17 Underage drinking, Part I. Data collected by the Substance Abuse and Mental Health Services Administration (SAMSHA) suggests that 69.7% of 18-20 year olds consumed alcoholic beverages in any given year.

(a) Suppose a random sample of ten 18-20 year olds is taken. Is the use of the binomial distribution appropriate for calculating the probability that exactly six consumed alcoholic beverages? Explain.
(b) Calculate the probability that exactly 6 out of 10 randomly sampled 18- 20 year olds consumed an alcoholic drink.

```
dbinom(6, 10, 0.697)
```

```
## [1] 0.2029488
```

(c) What is the probability that exactly four out of ten 18-20 year olds have not consumed an alcoholic beverage?

```
binom <- choose(10, 4)*(0.303^4)*(0.697^6)
dbinom(4, 10, 0.303)
```

```
## [1] 0.2029488
```

(d) What is the probability that at most 2 out of 5 randomly sampled 18-20 year olds have consumed alcoholic beverages?

```
pbinom(2, 5, 0.697)
```

```
## [1] 0.1670716
```

(e) What is the probability that at least 1 out of 5 randomly sampled 18-20 year olds have consumed alcoholic beverages

```
1 - pbinom(1, 5, 0.697)
```

```
## [1] 0.9680714
```

```r
pbinom(1, 5, 0.697, lower.tail = FALSE)
```

```
## [1] 0.9680714
```