Mini-Midterm 1 Solutions

1. **B** The average weight was computed from a sample, making it a statistic.

2. **C** Measuring temperature in the Celsiuis or Farenheit scale an example of a Interval measurement, while Kelvin is Ratio.

3. **B** This is a binomial experiment. Using `binompdf(8,0.55,4)` gives 0.26266.

4. **B** Since **all** teachers at the random schools were interviewed, this is cluster sampling.

5. **B** The class width is the difference between **lower class limits**, not the high and low value of a class. So, for example, 6-1=5 is the class width.

6. **B** To find the probability that a racket is wood or defective, we first find how many rackets are either wooden or defective. There are 100 wood rackets in total and 14 defective rackets that **are not wooden**. Thus the probability is $114/200 = 0.57$.

7. **A** Chebyshev's inequality tells us the minimal amount of data between two endpoints $\bar{x} \pm k \cdot s$ where s is a number greater than 1. We first find out how many standard deviations the endpoints of the interval are from the mean: $(44 - 26)/12 = 1.5$. Thus the amount of data is at least $1 - 1/(1.5)^2 = 0.55555$, or approximately 55.6%.

8. **C** A premature baby would be born at any pregnancy length of $268 - 21 = 247$ days or less. Using `normalCDF` we find that
$$\texttt{normalCDF}\,(-1\text{E}99, 247, 368, 15) \approx 0.087567.$$

9. **B** We need to find the probability that the number of successes in this binomial experiment is 6 or more, $P(x \geq 6)$. We will compute this by using $P(x \geq 6) = 1 - P(x \leq 5)$. Hence,
$$1 - \texttt{binomcdf}(10, 0.5, 5) = 0.37695.$$

10. **D** Using $\{0, 1, 2, 3\}$ into L_1 and $\{0.45, 0.37, 0.17, 0.01\}$ into L_2, `1-Var Stats` L_1, L_2 will compute both the expected value (or mean) of this distribution. Reading $\bar{x}$ give 0.74.

11. **C** Be sure to carefully read the key for stem and leave plots.

12. **B** Following the same strategy in problem 10, we see $\bar{x} = 3.6$.

13. **C**
$$\texttt{normalCDF}\,(-1\text{E}99, 20, 15.5, 3.6) \approx 0.89435.$$

14. (a) Since there are 87 flights in total, $48/87$.

    (b) There are 48 Upstate Airline flights and 33 on-time flights that are **not** Upstate. Thus, $81/87$.

    (c) There are 76 on-time flights, 43 of which are Upstate Airline. Thus, $43/76$.

    (d) There are 43 on-time, Upstate Airline flights out of the 87 total. Thus, $43/87$.

15. **B** This is a binomial experiment and we will call a success "a driver who was involved in an accident last year". Computing $P(x \geq 3) = 1 - P(x \leq 2) = 1 - \texttt{binomcdf}(14,\ 0.08,\ 2) = 0.09583$.

16. The number of defective clocks is 7% of 8000, which is 560 defective clocks. We first compute the probability of selecting **all good clocks.**

$$\left(\frac{7440}{8000}\right) \cdot \left(\frac{7439}{7999}\right) \cdot \left(\frac{7438}{7998}\right) \cdot \left(\frac{7437}{7997}\right) \cdot \left(\frac{7436}{7996}\right) \approx 0.6956$$

The reason for this is the complement to **at least one defective** is that **none are defective**. Thus the probability of at least one defective is $1 - 0.6956 = 0.3044$.

A tempting, but incorrect solution would be to use `1-binomcdf(5,0.07,0)`...

17. (a) Typing all the data into L_1 and using `1-Var Stats` we get $S_x = 11.0721$.

    (b) The largest value is 62 and the smallest is 27. We then compute $(62 - 27)/8 = 4.375$ since we want 8 classes. Increasing this to the next integer gives a class width of 5. So the classes will go 25–29, 30–34, etc.

Age	Midpoint	Frequency	Relative Frequency	Cumulative Frequency
25 - 29	27	3	3/34	3
30 - 34	32	3	3/34	6
35 - 39	37	6	6/34	12
40 - 44	42	4	4/34	16
45 - 49	47	5	5/34	21
50 - 54	52	3	3/34	24
55 - 59	57	5	5/34	29
60 - 64	62	5	5/34	34

18. **A** The first thing to note is the question asks for the probablility that a **sample mean** is between 68 and 70. Using the central limit theorem, this sample mean will be normally distributed with mean 69 and standard deviation $2.8/\sqrt{64}$. Thus,

$$\texttt{normalCDF}\left(68, 70, 69, 2.8/\sqrt{64}\right) \approx 0.995725.$$

If one were to use tables, one would get the exact answer listed in option A. As this is a multiple choice, we will select the nearest answer.