

Name: \_\_\_\_\_  
MATH 107  
Winter 2022  
HW 20: Due 01/20

*“Facts are stubborn things, but statistics  
are pliable.”*

*–Mark Twain*

**Problem 1.** (10pt) What assumptions are required for the Central Limit Theorem to apply?

**Problem 2.** (10pt) Suppose a sample,  $X$ , is drawn from a normal distribution with mean 220 and standard deviation 18.

(a) Find  $P(X \leq 200)$ .

(b) Find the probability that a sample of size 8 will have an average less than 200.

**Problem 3.** (10pt) SAT scores in 2017 had mean 1060 and standard deviation 195.<sup>1</sup> If you randomly sampled 40 students, find...

- (a) The probability that their average score was less than 1000.
- (b) The probability that their average score was greater than 1100.
- (c) The probability that their average score was between 1000 and 1100.

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<sup>1</sup>[https://nces.ed.gov/programs/digest/d17/tables/dt17\\_226.40.asp](https://nces.ed.gov/programs/digest/d17/tables/dt17_226.40.asp)

**Problem 4.** (10pt) Suppose that 17% of new cars will receive some minor repair after 2 years. If you take a simple random sample of 500 cars, find the probability that less than 60 of the cars will need a repair in their first two years.

**Problem 5.** (10pt) Watch The New York Times' video, “[Bunnies, Dragons and the ‘Normal’ World: Central Limit Theorem](#)” on YouTube. Being as detailed as possible, comment on what you learned and how it relates to the course material.