**Name:** _____

**MATH 107**
**Winter 2022**
**HW 19: Due 01/20**

*"And I believe that the Binomial Theorem and a Bach Fugue are, in the long run, more important than all the battles of history."*

*–James Hilton*

**Problem 1.** (10pt) What are the assumptions on a count for that count to have a binomial distribution?

**Problem 2.** (10pt) Suppose you have a count, $X$, from the binomial distribution $B(9, 0.15)$. Find the following:

(a) $P(X = 3)$

(b) $P(X < 2)$

(c) $P(X \geq 4)$

(d) $P(1 \leq X < 5)$

**Problem 3.** (10pt) Suppose that 80% of people *do not* play video games. If you took a random sample of 16 people, what is the probability that exactly 5 people in the sample *do* play video games?

**Problem 4.** (10pt) Suppose that only 1 in 4 third graders believe in Santa. If you ask a class of 7 students if they believe in Santa, compute the following:

(a) the probability that 2 of them believe in Santa.

(b) the probability that at least one of them believes in Santa.

(c) the probability that less than 5 of them believe in Santa.

**Problem 5.** (10pt) On YouTube, watch the Institute of Quality and Reliability's video "Binomial Distribution and its applications." Being as detailed as possible, comment on what you learned and how it relates to the course material.