Problems from Assignment 21

1. Using the same level of rigor that we used in class show that for large n:

$$\ln \left(\frac{np}{x}\right)^x \approx -t\sqrt{npq} - \frac{1}{2}t^2 q^2 + O\left(\frac{1}{\sqrt{n}}\right).$$

(Remember that $t = \dfrac{x - np}{\sqrt{npq}}$.)

2. Suppose that there is a major flood every two years.

    (a) Find the probability that in a given year there are five major floods.

    (b) Find the probability that there is 5 floods in a year in one of the next 100 years.

3. Suppose $Z \sim \mathrm{N}(0, 1)$.

    (a) Find $P(-2 \leq Z < -1)$.

    (b) Find (to the best you can) a such that $\mathrm{P}(-1 \leq X \leq a) = 0.6$.

4. Suppose $X \sim \mathrm{N}(-2, 5)$.

    (a) Find $P(-2 \leq X < -1)$.

    (b) Find $\mathrm{P}(X > 2)$.