QUESTION FOR MATH 343 FOR THE LECTURE OF 30 APRIL

Problem 1. Due to a machine being out of adjustment, widgets manufactured by Wang's Widgets Inc. have chipped paint with probability $\frac{1}{20}$. In a crate of 20 widgets selected at random, find the probabilities of each of the following events. Expand the binomial coefficients, for example,

$$\binom{12}{4} = \frac{12!}{4! \cdot 8!} = \frac{12 \cdot 11 \cdot 10 \cdot 9}{1 \cdot 2 \cdot 3 \cdot 4},$$

simplify any occurrences of $1 - \pi$ for some probability π, and make obvious cancellations, but don't do any other simplification or expansion.

(1) No widgets in the crate have chipped paint.
(2) Exactly two widgets in the crate have chipped paint.
(3) At most two widgets in the crate have chipped paint.

Date: 30 April 2021.