A chimpanzee named Sarah, who had been raised in captivity since age one, was the subject in a study of whether chimpanzees can solve problems. Sarah was shown 30-second videotapes of a human actor struggling with a problem (for example, not able to reach bananas hanging from the ceiling, a record player not playing). Then Sarah was shown two photographs, one that depicted a solution to the problem (like stepping onto a box, plugging in the record player) and one that did not match that scenario.

Researchers watched as Sarah selected one of the photos, and they kept track of whether Sarah chose the correct photo depicting a solution to the problem. They repeated this for 8 different problem-solving scenarios. Let the random variable $X$ represent the number of these 8 scenarios for which Sarah chose the correct problem-solving photo.

1-2. Complete this sentence: If Sarah is randomly guessing for each scenario, then $X$ would have a ________ distribution with parameters $n = ___$ and $p = ___$.

The researchers found that Sarah chose the correct photo in 7 of the 8 scenarios that she was presented.

3. Determine the probability that Sarah would choose the correct photo for exactly half of the 8 scenarios if she were just randomly guessing for each. Show your work.

4. Determine the p-value for this study. Show your work.

5. Based on the p-value, would you say that Sarah’s result provides some evidence, fairly strong evidence, or very strong evidence that she has some ability better than randomly guessing? (Choose one of these 3 options.)