Circle True or False or leave blank. (1 point for correct answer, -1 for incorrect answer, 0 if left blank)

1. True   False   The hyper geometric distribution assumes that trials are dependent (without replacement) while the binomial distribution assumes that trials are independent.

2. True   False   If f is the PMF of a random variable X, it is possible for $f(E[X]) = 0$.

Show your work and justify your answers. Please circle or box your final answer.

3. (10 points) (a) (3 points) At the Olympics, suppose that the number of medals per athlete is Poisson distributed with an average of 0.5 medals per athlete. What is the probability that in a team of 12 athletes, they have 6 medals amongst them?

   (b) (4 points) Now suppose I go to a party with 40 random athletes at the Olympic Village and on average, I expect to see 10 gold medalists there. If there are 100 gold medalists total at the Olympics, how many athletes are at the Olympics?

   (c) (3 points) With the same numbers as part (b), suppose that I throw a party and invite 10 random athletes. What is the probability that amongst them, 4 of them are gold medalists?