

MATH 396 QUIZ I

Note: Please only set up the solutions to the problems. E.g. $P(X \text{ happens}) = \frac{1}{\sqrt{2\pi}} \int_2^7 e^{-t^2/2} dt$ is an answer preferable to the decimal approximation.

1) A loaded tetrahedral die has a probability of showing side j proportional to j^3 for $j = 1, 2, 3, 4$. Let X be the random variable describing the outcome of throwing this die. Write the p.d.f. p_X . Find $P(X \geq 2)$.

2) For the previous problem, compute $E(X)$ and $Var(X)$. Also, find the probability of hitting 4 given that you've hit 3 or 4.

3) Suppose that at any given time I am equally likely to have any amount of money in my pocket between 0 and \$ 20. Write the p.d.f. for

$X =$ how much money JJ's got right now.

Compute $E(X)$ and $Var(X)$.

4) Suppose that on-the-job injuries in some factory occur at a rate of 0.1 per day. What is the probability that k accidents will happen in a given five-day work week? Find the probability that the next two injuries will occur within the same five work-day period (it counts if the accidents leapfrog the weekend).

5) A basketball team have a 70% foul-shooting percentage. Write an expression giving the exact probability that of their next 100 free-throws they make between 75 and 80 (inclusive). *Hint:* Binomial. Approximate this quantity.

6) Suppose 100 fair dice are rolled. What is the probability that the sum of the faces showing, S , equals 100? How about $200 \leq S \leq 300$?