1. A fair coin is flipped 5 times. What is the probability that fifth flip is a head, given that each of the first 4 flips resulted in heads?   10%

2. The random variable X has the probability function   10%

$$P_X(x) = \frac{1}{3}, \quad \text{for} \quad x = 0, 1, 2,$$
$$= 0, \quad \text{otherwise.}$$

What is the distribution function for X?

3. X is uniform on (1, 5) and Y is exponential with parameter λ. Find λ such that $\sigma_X^2 = \sigma_Y^2$.   10%

4. Show that $E[(X-b)^2]$ is minimized if $b = \mu_X$.   10%

5. Using the Poisson formula to compute $P(5 < x < 6 | \lambda = 3.4) = ?$ 10%

6. Answer the following questions.   9%
   a. What is a statistic?
   b. What is a level of significant?
   c. What is the Wilcoxon signed-rank test?

7. In a completely randomized experimental design, 20 experimental units were used for each of the 3 levels of the factor (i.e., 3 treatments). Fill in the blanks in the following ANOVA table.   21%

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F
Between Treatments	(a)	(c)	107.1262	
				(g)
Error (Within Treatments)	(b)	(d)	(f)	
Total	6880.8	(e)		

8. Your advisor is currently working on a research about how much time college students in Taiwan have spent on studying? You are asked to collect data. How would you sample?   20%

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