

THE UNIVERSITY OF HONG KONG  
DEPARTMENT OF STATISTICS AND ACTUARIAL SCIENCE

STAT3602 Statistical Inference  
(2020-2021 First Semester)

Example Class 1

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**Exercise 1**

Each semester evening between Sunday and Thursday, the HKU superintendent has to decide whether to call off the next day school because of Tropical Storm/Black Rainstorm conditions.

If he fails to call off school and there is storm, there are various possible consequences, including students and teachers failing to show up for school, the possibility of traffic accidents etc.

If he calls off school, then regardless of whether there actually is storm that day there will have to be a make-up day later in the year. After weighing up all the possible outcomes he decides that the costs of failing to close school when there is storm are twice the costs incurred by closing school. If he does not call off school and there is no storm, then of course there is no loss.

Two local radio stations give independent and identically distributed weather forecasts. If there is to be storm, each station will forecast this with probability  $\frac{3}{4}$ , but predict no storm with probability  $\frac{1}{4}$ . If there is to be no storm, each station predicts storm with probability  $\frac{1}{2}$ . The superintendent will listen to the two forecasts this evening, and then make his decision on the basis of the number of stations forecasting storm.

- Formulate the above into a decision problem and calculate the risk functions corresponding to the deterministic rules.

**Exercise 2**

Let  $X$  be uniformly distributed on  $[0, \theta]$ , where  $\theta \in (\theta, +\infty)$  is an unknown parameter. Let the action space be  $[0, +\infty)$  and the loss function  $L(\theta, a) = (\theta - a)^2$ , where  $a$  is the action chosen. Consider the decision rules  $d_\mu(x) = \mu x$ ,  $\mu \geq 0$ . For what value of  $\mu$  is  $d_\mu$  unbiased?