DPH101/ENV203 Assignment: Discrete Probability Distributions

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Due at 8:55 AM on 14 October 2019

Instructions

This assignment consists of one question with five sub-questions. Your submission must be made on ICE in a *single* .Rmd file with a PDF output style using your student ID as file name. For example, *1234567890.Rmd*. Other file types will not be allowed. Other file names will not be allowed.

Question. 60 marks.

It is well known that taste in humans includes sweet, sour, salty and bitter. A lesser known fifth taste called *umami* was identified almost 100 years ago in Japanese seaweed broth. Umami is not easy to describe but is often characterised as full bodies, savoury or rich. Umami is caused by the free form of the amino acid glutamine. Scientists have identified both the specific receptors on the tongue for the umami taste and the particular nerves that transmit the signal to the brain and, therefore, have accepted umami as a legitimate taste. Not all people can identify the umami taste and most who cannot confuse it with saltiness.

Suppose a small restaurant determines that 80% of its patrons are umami tasters. In a week, it serves 210 people who can detect the taste. Find the probabilities of the following events.

1. (10 marks) A random sample of 17 people has exactly 14 tasters.
2. (10 marks) A random sample of 17 people has 14 or more tasters.
3. (10 marks) A random sample of 17 people has less than 14 tasters.
4. (10 marks) In a week, exactly 17 people who can detect the taste are served.
5. (20 marks) In a day, exactly 17 people who can detect the taste are served.