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**Game Intelligence**

**Data Analyst Assessment**

**Instructions**

* You have 24H from the time of cloning/downloading this repository to submit your solutions and workings.
* Please save your solutions and workings within the local repository of this assessment that you have cloned and use it to create your own github repo (which you can then share with us), or zip the repo folder which includes your solutions and workings and email it to us.
* If you prefer writing on paper when solving the Probability and Logic section, you may take pictures of the solution and workings and include them in the repo. Please name the files appropriately.

*Note – candidate need not prepare a formal presentation in the allowed time. Ability to compile a presentation is not being examined. It will suffice to present your workings, thoughts and analysis in their original form*

**Probability and Logic**

1. You are shut in a prison cell and asked by the guard to tell him when exactly 7 and a half minutes have passed. If you are correct, you will be set free, wrong, and you will be imprisoned for eternity. You have two pieces of string and a lighter. You are promised that by lighting one end of either string, it will take 10 minutes to burn to the other end, however the strings do not burn at a uniform rate (some subsections take longer than others). Can you set yourself free? How? (Assuming the time it takes to light a string is negligible)

**Recommended time: 0.5 hours**

1. You’ve completely mixed up your exam dates, and suddenly realize that your math exam is tomorrow. You haven’t yet started studying. It is now 6:00 PM and your exam is at 10:00 AM. You determine that you have enough time between now and the exam, to cover 100% of the course material, with exactly one hour to spare. If you decide to sleep for any number of hours, any course material not covered as a result will mean you cannot answer that proportion of marks in the exam. For the proportion of material that you have covered, your scoring rate in the exam is dependent on the quality of your sleep. Your maximum scoring rate is achieved at 8 hours of sleep – 87% of material answered will be correct. Sleeping more than 8 hours does not increase the scoring rate and studying beyond 100% of course coverage also does not provide any benefit. For every hour of sleep less than 8 hours, your scoring rate depreciates by 7.9% of the previous scoring rate, ie. at 7 hours, your scoring rate is 87% less 7.9% of 87% = roughly 80.13%. At 6 hours it is then 80.13% less 7.9% of 80.13%, and so on.
2. Assuming you always follow a perfectly uniform rate of study, and that the exam is perfectly balanced in terms of course material (ie. you can study for, and answer for any arbitrary fractional percent of the entire paper, example 74.3578%), are you able to pass the exam if the pass mark is 50%? How many hours should you study for to achieve the maximum amount of marks (you may study to any arbitrary fraction of an hour).
3. On your way to the exam hall you meet a classmate that you’ve never noticed before. She is shy and very soft-spoken. You wonder if she belongs to the pure math stream that is taking this course, or the business science stream (the only other stream taking the course). You make a judgement based on past experience that a student in the math stream is 8 times as likely as a business stream student, to be shy or conservative. At the start of the semester, you recall paging through the class list. There were 349 business science majors, and 29 math majors. What is the likelihood that this girl is a math major?

**Recommended time: 1.5 hours**

**Data Analysis**

The video game industry has been one of the fastest growing markets in recent years. Creators of video game titles (known as software providers), market their games to gamers, the consumer base, who then purchase the games to own and play. Games are sold specific to the platform on which it was developed for. A game purchased for Playstation for instance, cannot be played on Xbox. It is quite common for the same game to be developed for multiple platforms, as it makes business sense to appeal to the largest consumer base possible.

**OverboardTM** is a gaming software provider with a focus on lightweight titles that can be played across mobile devices such as cellphones and tablets. They have a portfolio of over 45 games, the first of which was released in the second half of 2011. Due to varying regulatory requirements across the 4 different platforms on which their games are launched, the company has had to deploy different business models to suit the needs of each one. On mobile platforms, it is well understood that expensive titles, often create a wall that blocks out potential players, as the monetary commitment up front is too high. Therefore, the business model employed is one in which the games are provided as free to play up front, but have in-game items (that give players advantages) which cost money to purchase. These are known as microtransactions. On the non-mobile platforms, there are strict regulations around microtransactions, and thus the business model is simplified in which there is an upfront cost to purchase the game, but no purchases thereafter.

Last year (2017) the company released 12 titles across a variety of themes and platforms. The company employed a new strategy for mobile games released after 1 August. This strategy involved providing free ‘loot boxes’ to players on a weekly basis, which contained random items that could be purchased normally in-game. The free loot boxes were limited to 1 per week, but additional loot boxes could be purchased by players. Details aside, the exec of marketing has come to you to find out whether this strategy has had positive effects, which could range from better player engagement, players spending more in game, or the game attracting more players. The mobile platforms across which titles are deployed are iOS and Android, however due to regulations on the Apple app store for iOS, which banned loot boxes, the company was only able to deploy this strategy to Android.

You are provided with aggregated performance data for all 12 titles released in 2017, for the first 2 weeks (14 days) since each games’ launch. Uncover any effects, positive or negative, from the new loot box strategy. You are encouraged to use any statistical and/or analytical techniques to back up your answer. Please refer to the “columns.txt” file for a description of the provided csv data files.

**Recommended time: 3.5 hours**

**(You will be required to present your answer to us, however you should also be prepared to explain results as if it were a non-technical audience. We are looking only for a logical expression of your findings, so you should not spend time on fancy power point presentations, or pretty report documents.)**