Homework #2 – PubAfrs 4010 – Due 19 September 2024 @ 11:59pm on Canvas.

Name:

Note: I encourage you to not use any sort of AI-based programs for this homework assignment. In the event that you must, please make it clear where you used it.

Decision Trees:

1. Jack is planning a date with Jill. He has settled on 3 potential options. Unfortunately, these 3 spots don't take reservations, and wait times are hit or miss. He thinks that the perfect date would have a great atmosphere and minimal waiting. The food at spot 1 might be the best in the city, but accordingly it's also very frequently crowded. If Jack and Jill go there and there is no wait, they will have a fantastic date. However, if they go there and the wait is too long, they will spend all night standing in line and won't get to enjoy the evening. Spot 2 is a little crazier. The food is typical bar food, but Jack is pretty sure that they can get in without waiting. If they do, they'll have a nice time. If they must wait at Spot 2, Jack knows this will be their last date. Spot 3 is decent. The food is good enough that Jill will enjoy it and the risk of waiting in line is in between Spot 1 and Spot 2.

   Using the information above, sketch a decision tree. Make up some probabilities of wait time that match the story, and give some numeric values to the outcomes that Jack will experience if he reaches each branch. You do not need to solve this. Just complete the decision tree.

2. Latisha is deciding whether she should buy OSU football tickets next year, and (if so) where? She has decided that she will only buy football tickets if her expected resale value is at least within 25% of what she pays for the tickets. If both options are viable, she will choose the one that is more lucrative. She can buy student tickets for $500 and C-deck tickets for $1000. If she buys tickets in the student section and the team has a positive record, she expects that she can

sell the ticket for 20% more than what she bought it for. However, if the team has a losing record, then she can only sell the tickets for 10% of what she purchased it for. On the other hand, if she buys the C-deck tickets and the team has a winning record, she can sell her tickets for 2x more than what she purchased it for. If the team has a losing record, she can still sell the ticket for 60% of what she purchased it for. The football team is expected to have an 85% chance of having a winning record this year. Which (if any) should Latisha buy? Please draw the decision tree, and solve the problem.

3. Jose is the lead researcher on an article that is going to be sent out shortly. There are 10 members on the research team, and although Jose is the primary contributor to this manuscript, there is a more famous researcher on the list of authors. The other members of the team have discussed with Jose that they might want to change the order of authors so that the world-renowned scholar Franz Larner might be the lead author. The team believes that by re-shifting the order of the authors around that the article will have a better shot at being published in a better journal. Ultimately, Jose must be the one to decide to keep himself as the author, or make Franz the author.

   What complicates this decision for Jose is that his placement in the order of authors and the reputation of the journal are the two most critical elements in his future success (based on this article, at least).

   Additionally, there are two journals that the research team can sent the manuscript to: Good Journal and Bad Journal. If Jose is the lead author and it is accepted at Good Journal, then the impact on his future is 100. If Franz is the lead author at Good Journal and it is accepted, the benefit for him is 40. If Jose is the lead author at an article accepted at Bad Journal, his benefit is 40. If Franz is the lead author at an article accepted at Bad Journal, then his benefit is 10. If the articles are rejected, he receives no benefit regardless of whether he is the author or not.

   Assume that the likelihood of acceptance at Bad Journal is 70% for

both Jose and Franz as lead author, and that the likelihood of acceptance overall (which is what Jose should expect as lead author) is 3%. Because Franz is so renowned, the team expected the likelihood of acceptance with Franz as lead author is greater than 3%. What must the acceptance rate with Franz as lead author at Good Journal be in order for Jose to choose submitting to Good Journal with Franz as the lead author (amongst all the 4 options)?

Draw the decision tree and solve.

4. Two candidates are running for president. Both thinks the other is extreme, and is trying to determine the optimal strategy for its campaign. The top priority for each candidate is to win – and each is willing to pander to whichever group will give him/her the greatest chance of winning (meaning that he/she does not necessarily believe what he/she says, but believes it will garner the most support for the campaign).

   The Bipartisan Policy Center estimates that there are 244-million voters for the 2024 election. The Pew Research Center estimates that about 33% of registered voters are registered Democrats and that 32% are registered Republicans, which means that about 35% of the population of registered voters view themselves as independent voters.

   Both candidates have to motivate voters so that they will come out to vote and minimize how many voters will be turned off by a position that is seen as too extreme. Let's examine one of the candidates, Alpha who is running in the Democratic Party.

   If Alpha adopts an extreme position, she expects that 70% of registered democrats will come out to vote, and that 20% of independent voters will come out to vote. The remaining 30% of Democratic Party voters will not vote (stay home), but that 30% of the remaining independent voters will vote for the Republican candidate. The remaining 50% of the independent voters will stay home.

On the other hand, if she adopts the moderate position, she expects that 65% of her base will come out to support but that 50% of the independent voters will come to support her. The remaining 35% of the base will not vote, 20% of independent voters will vote for the Republican candidate.

To make this problem more tricky, we need to also consider what effect this will have on the Republican Party candidate, Beta. Beta is running as an extreme candidate, and 85% of his base will be motivated to vote, and only 15% will find him too extreme and will stay home (but will not vote for Alpha). Beta has already decided to campaign as extreme, so we are only considering the optimal strategy for Alpha.

What should Alpha do? Hint: You might not need a decision tree, but this will probably require careful reading to sort out the expected outcomes. You might think about "net benefit" for each decision here to be the (Number of Alpha Voters – Number of Beta Voters).

5. Now let's make this problem a little more realistic, but unfortunately a little more challenging. Let's introduce the impact that weather might have on election turn out. Based on projections, the weathermen are predicting that election day could coincide with an extreme heat wave. They predict that this will occur with 20% probability.

   If there is no heat wave, then the problem is the same as in #4. If there is a heat wave, then there will be a differential impact on voter turnout. In particular, the heat wave will affect the voter turnout for Beta more than for Alpha. If Alpha adopts an extreme position and there is a heat wave, only 60% of Republican voters will turn out for Beta, and only 20% of Independent voters. 65% of Democrat voters will turn out for Alpha and 15% of Independent voters. If Alpha adopts the moderate position, still only 60% of Republican voters will turn out for Beta, but 45% of Independent voters will turn out for Alpha and 10% for Beta.

Now draw the decision tree. What is Alpha's decision now?

Answers:

2. C-deck tickets.

3. At least 70% (so unlikely this will be his decision).

4. Adopt moderate position.

5. Continue to keep moderate position.