State whether the mean, median, or mode would be useful in the following scenarios:

You are doing population statistics. You are asked to give an estimate of the typical income of a single person in the country. There is one snag: wealth distribution is out of whack, and 10% of the population holds 70% of the nation's wealth.

A: In this scenario the mean would not be correct as 10% of the population holding 70% of the nation's wealth would skew the mean income upwards Median would be a correct approach for this scenario as median is not affected by extreme values or outliers and it will give us the middle value of income when arranged in ascending order. Mode gives us the most frequently occuring income which not be correct in this context. There may be wide variety of income levels without a clear mode.

You are running a restaurant, and you are reviewing your menu. You have a list of all orders over the last six months. You are trying to find out which item you should keep based on what customers seem to like the most.

A: In this scenario I think the mode would be most useful as finding out which menu item was ordered the most is indicated by the mode. It would make sense to look at this data and keep the most ordered items in the menu. Mean would give average popularity of items by summing number of order of each item divided by total number of menu items. But if some items are popular than others they would skew the mean and mean would be heavily influenced by these items. Median would give the middle items when arranged in order of popularity. So mean and median would not be useful here.

You have been buying electricity once a month for the first six months of the year. You are trying to budget your electricity for the rest of the year and therefore need to estimate how much you will spend for the remainder of the year.

A: For budgeting the expense the mean would be the most suited as it gives the average spend on electricity in the first six months of the year. This could be a good indicator as to what to expect the next 6 months. However if there are significant changes in usage patterns for example season changes heaters on in winter the mean would not be entirely accurate. Mode and median would not be suitable as mode will the most frequently occuring spend and median the middle two values of spend which cannot be used as prediction for future spends.

You work in healthcare insurance. You are asked to provide an estimate of the typical amount of money spent on healthcare. This is taking into account the fact that there are a few people who spend a large amount of money on medical healthcare due to major issues.

A: Median would be correct in the above scenario as it would provide the middle value when arranged in ascending order. A typical policy holders spending on

healthcare would be indicated by this. Mode and mean would be incorrect as mode represents the frequent occuring spending amount which does not indicate typical spending by a spenders and also mean would represent and skew heavily influenced by a few spenders who spend a lot on healthcare.

State whether you would use variance or standard deviation to inform the following decisions: You are choosing a new Internet provider. You find two providers with the same mean speed, but you want to have a more stable connection. You get a list of all reported speeds over the last month and are trying to find the provider that doesn't move too much from the mean value.

A: Standard deviation would be a good choice as it is square root of variance and it is expressed in same units as original data. Understanding variability in speeds is easier with Standard deviation. A lower standard deviation indicates stable speeds. Variance on the other hand shows us the spread of the speed as it is in squared units and cannot indicate the stability of the speed as clearly as standard deviation would.

You are going on holiday to Mauritius. You need to find a shuttle from the airport to your hotel, but you are worried about being overcharged or undercharged (being undercharged might mean that you get unreliable transport). You get a list of all available shuttle service prices and need to find out which services, if any, are overcharging or undercharging.

A: In this case it would be good to look at variance as a higher variance indicates a higher variability in prices which means some services are overcharging or undercharging compared to average price. It is better to look at shuttle prices with less variance as it suggests prices are more consistent and less likely to overcharge or undercharge. Standard deviation could also be looked at in this context as it is square root of variance as it would help analyse how much price deviated from the average which can help assess consistency of prices. Overall a shuttle with lower variance(or standard deviation) needs to be chosen to minimise risk of being overcharged or undercharged.