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Business Insights Analyst Challenge

Below are some questions for you to ponder. Choose at least two of them and send your solutions to recruiting@eighty20.co.za. Complete more than two if you want to impress. Your choice of questions and quality of answers will greatly influence our hiring decision.

Question 1 – Birthdays

Attached is a list of a particular company's clients' birthdays (Q1_birthday_challenge.txt). There is something very interesting in the data. What is it? How do you think this happened?

Question 2 – SQL

Consider the following table, representing the results of a survey asking people their age, gender and education (full tables attached, Q2_survey.txt and Q2_key.txt)

id	ageband	gender	education
1	3	6	7
2	1	6	7
3	2	5	7
4	3	6	10
5	2	5	10
6	3	6	19
etc.	etc.	etc.	etc.

Lookup	descr
1	20 - 29
2	30 - 39
3	40 - 49
4	50 - 59
5	male
6	female
7	none
8	primary
9	secondary
10	teritary

Write an SQL statement that produces the following summary results (for ageband)

ageband	count	ids
20 - 29	18	2,11,36,42,...
30 - 39	24	3,5,10,12,...
40 - 49	26	1,4,6,9,13,...
50 - 59	32	7,8,15,16,...

Similarly, give the SQL statement for gender and education. Ensure your solution wouldn't change much if the survey had many more questions.

Question 3 – Financial Modelling

A company sells contracts for its products. Within the first year of each contract, it generates a loss of R65 and from then on, that contract generates profits of R30, R50 and R65 in its second, third and fourth years respectively after being sold.

The company estimates that it will sell a total of 1,000 contracts in 2019 and expects 5% of those contracts to lapse at the end of each year. The company further plans to increase the rate of new contracts they sell by 10% per annum in future years up to and including 2025.

Operating costs in 2019 amount to R3,000 per year plus R3 per year for each active contract, both figures increasing by 6% per annum.

1. Calculate the internal rate of return for this venture up to and including 2025 (Assume all cash flows occur at the end of each year)
2. The company has no excess funds to absorb the initial losses, but can borrow cash at 12% p.a. Assume that funds are borrowed as and when needed, and paid back as soon as there is any free cash flow from the business. Find the net present value of the resulting cash flows, at a risk discount rate of 26.35% p.a.

Present your solution as an Excel model, clearly showing your methodology and any assumptions you make.

Question 4 – Case Study

EdgarWoolPEP is an established retailer with over 1000 outlets around the country. It sells clothing, footwear, general household goods and small electrical appliances.

For the past 10 years, it has also been selling airtime and prepaid starter packs. Until recently starterpacks were displayed on the shelves, together with dummy handsets with the deals of the month. If the customer wanted to purchase a handset (which always comes with a starterpack), he would need to find a staff member to assist, who would go to the storeroom and fetch a real handset. The actual purchase would happen at the till, where the purchaser would have to be RICA'd.

About eight months ago, EdgarWoolPEP piloted several kiosks in store which were dedicated to cell phones. One or two staff members would be dedicated to the kiosk, which would hopefully make it easier for the customers to purchase a starterpack, particularly if it was accompanied by a handset. Handsets would be stored at the kiosk, and customers could be RICA'd there, making the whole experience quicker and easier without delaying other customers at the tills.

The management of EdgarWoolPEP are trying to assess whether the introduction of the kiosks has made a positive impact on the business. In particular, they want to know:

1. Have the kiosks had a positive impact on the sales of
 - airtime sales
 - starterpacks (without handsets)
 - starterpacks (with handsets)
 - general merchandise
2. How can the effects be quantified?

3. What are the characteristics of a high performing kiok vis-a-vie a poorly performing kiosk? (staff allocated, type of store (rural, urban, size, etc.) EdgarWoolPEP rolled out kiosks in a range of stores around the country according to the following table:

Date	Total Number of Stores
Jan 2012	7
Feb 2012	12
Mar 2012	23
Apr 2012	44
May 2012	51
Jun 2012	57
Jul 2012	70

Describe the kind of analysis you would do to answer the questions listed above. Assume you can access to:

- the EdgarWoolPEP point-of-sale system so that you know exactly how many items of type i were sold at store s at date d , time t
- the type of kiosk (1-person, 2-person) and the operating costs

The price of a handset (staterpack included) ranges from R150 to R1000, and a starterpack on its own its sells for R1. EdgarWoolPEP gets $c\%$ of all future spend as a commission on airtime on starterpacks it sells (including airtime purchased outside of EdgarWoolPEP).

For any other assumptions you need, do something sensible.