Introduction

It is the new season of the "Masterchef Australia" [2] TV programme. In the grand opening of the first episode, audiences are presented with a one-time-in-history-only re-match cooking bout between Julie (last season's winner) and Poh (the runner up). This time however, both contestants cook for a buffet (i.e. cook in bulk) as opposed to à la carte (according to menu). Poh has been meditating on her narrow loss to Julie last season and would really like a second-go at the title. Through Ken, she learns that the project management students undertaking PMGT5887 are extremely smart and are technical experts in the problem area of optimisation. She approaches you and begs to provide her with technical advice for her cooking project. Based on her experience last season, she knows various facts that will help her to win this season (although the final call is made by the taste-buds of the judges! You need to satisfy their taste to rank high). For instance, she knows the taste preferences of the three judges – Matt, George and Gary; she also knows the range of dishes she can cook to surprise the taste buds of the judges, the stress she is able to handle in the competition, and the presentation impact of each dish which she artistically decorates. However, Poh is also aware of other factors in the show that will affect her win such as cooking time and TV ratings. Even better, based on last season's experience, she knows Julie inside out and believes has all the information she needs to defeat Julie. All she needs to know now is the combination of dishes it takes to satisfy a variety of her objectives in the show, given the set amount of money to spend. Hopefully, you can assist Poh in setting up a cooking plan which will ultimately lead to her winning in this new season. All the best!

For the purpose of the assignment, you will need to use Scenario Manager and Excel Solver to provide the advice they need.

General Information and Constraints

Poh has been given a fixed amount of $1,000 to spend. Being a conservative, Poh would like to spend as less as possible and will only spend excessively if necessary. From the standpoint of occupation health and safety (OHS), due to the intensive stress and pressure undergone by contestants in the previous season (Julie's mental breakdown, Justine's anguish, etc.), OHS groups have strongly protested against the show and have decided to boycott the show unless the mental state of the contestants are protected. To get the show going and keep the (annoying) OHS groups happy, the directors of the programme have secretly installed a stress detector device that monitors the stress levels of all contestants. The maximum stress level units have been set to 100 units (anything above this causes contestants to go totally berserk & mental!). Furthermore, the directors have also imposed these competition rules: (1) all buffet dishes must total to at least 5,000 calories (to sustain hunger) for the perpetually hungry judges and (2) that all the quantity of dishes totalled up must be able to feed at least 150 people. Poh has listed all the information that she knows in the table below. She brings this information to you and asks you to help her further. She specifically informs you that certain items (cooking time, presentation impact, TV fun & impact factor & the judges' ratings) are not affected by the planned quantity of dish items.

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[2] This is a hypothetical case study – characters and concepts based on "MasterChef Australia"

Planned Amount	Dish Items	Type	No. of people per serve	Calories per serve	Cooking time (minutes)	Presentation Impact *	Cost per serve	TV Fun & Impact Factor *	Stress Level per serve *	Taste Rating: Judge Gary *	Taste Rating: Judge George *	Taste Rating: Judge Matt *
	Spring Roll	Appetizer	1	320	40	2	$10	1	3	4	2	2
	Fish Cakes	Appetizer	1	260	35	1	$15	5	4	5	5	3
	Finger Chips	Appetizer	4	295	6	2	$10	3	2	4	3	5
	Fish Fingers	Appetizer	4	245	5	2	$10	3	3	2	1	5
	Tom Yum Soup	Appetizer	1	160	30	3	$20	4	5	2	2	3
	Tomato Soup	Appetizer	1	160	20	3	$15	4	2	3	5	2
	Sweet Corn Soup	Appetizer	1	180	20	3	$25	3	3	2	2	2
	Chicken nibblets	Appetizer	5	195	10	2	$15	4	4	3	1	1
	Celery, Carrots & Dip	Appetizer	4	150	5	1	$10	1	1	3	5	1
	Total											
	Sage & Garlic Chicken	Main	4	320	30	5	$45	5	4	5	1	5
	Hainanese Chicken Rice	Main	2	200	25	4	$30	5	3	1	4	5
	Lamb Brain Cereal	Main	4	200	30	5	$35	5	2	3	5	1
	Smoked Chicken Pasta	Main	1	350	40	5	$40	5	4	4	3	5
	Lamb Roganjosh	Main	4	300	50	3	$45	1	2	3	3	2
	Stir Fry Vegetables	Main	4	125	10	1	$10	2	2	5	2	2
	Hospital Grade Steam Vegies	Main	4	50	7	1	$5	3	1	3	3	1
	BBQ Beef with shredded Fish	Main	2	300	15	3	$40	5	5	1	4	1
	Vanilla flavoured Lamb Chops	Main	2	260	30	4	$60	5	5	5	5	3
	Tandoori Chicken	Main	5	275	60	4	$45	5	5	4	2	5
	Thai style Beef BBQ	Main	2	285	45	4	$45	5	3	4	4	4
	Steamed Potato with salt	Main	5	100	10	1	$5	2	1	3	5	1
	Total											
	Braised Tomatoes with Chocolate Mousse	Dessert	1	300	20	5	$50	5	2	2	2	2
	Aria Chocolate Tart	Dessert	1	250	20	5	$55	5	4	1	3	2
	Vanilla Pannacotta with Macarons	Dessert	1	400	20	5	$35	2	5	5	2	5
	Strawberry Tart	Dessert	1	250	10	4	$20	3	5	2	5	5
	Crepe Raspberry	Dessert	1	260	10	4	$25	5	3	2	4	2
	Roasted Salmon-flavour ice-cream	Dessert	1	185	25	1	$20	3	3	1	1	2
	Total											

Items with a * use a scale of 1 to 5 (where 1=very low/bad; 5=very high/good)

Your Tasks

In this assignment, you will model a professional plan (with the help of spreadsheets) for Poh's decision making purposes. Given the above plan produced by Poh, you are required to carry out the following 3 important integrative tasks:

Task 1:

You need to develop an optimisation model to help Poh optimise her cooking plans to achieve her goal. Poh would like to develop a number of scenarios based on different optimisation objectives:
1. Minimising cost
2. Minimising stress
3. Minimising calories
4. Maximising number of people served

It is very important that you need to develop and state clearly *the objective function* and *the constraints* based on the information given for each objective. Based on the optimisation model, you need to implement the optimisation model using ***solver*** to help Poh optimise her initial plan based on the tasks above.

Task 2:

Based on last season's experience, Poh has knowledge of Julie as a conservative when it comes to spending money. She reckons that Julie will only spend lesser than half of the entire budget given. She estimates this amount to be $450. Poh also knows that Julie is extremely bad in time-management (she admitted it herself in the show!) and because of this comes stress and nothing but stress. She believes Julie's stress level will be at 80 units, which is quite high. Also, knowing Julie's recipe for home-style meals, she thinks her style of cooking will be around the 8000 calories mark that caters for 370 people only. While Poh is confident that this time, she can win Julie in all aspects, Poh is quite keen to prove herself as a better chef than Julie on two grounds: that she can cook for more at a much lesser cost. Based on this information, you need to revise your assessment of the cooking plans for Poh.

Finally, another primary sub-task is whether Poh can refine/improve her model further without losing sight of other important factors for the show. You may make various assumptions to improve Poh's plan further. You can be very creative about this and make modifications to the plan developed just above. You also need to provide justifications for your recommendations.

Task 3:

Now that task 2 is over and Julie is finally beaten, Poh no longer needs to consider Julie's details in her plan and wants to focus on these important objectives instead. While still keeping the general constraints of the show, Poh wants to see the outcomes of the following objectives:

1. Maximising Presentation Impact
2. Minimising Cooking Time
3. Maximising TV Impact
4. Maximising Total of Judges' Ratings

The Deliverables

The presentation of your report (written in a document file (e.g. word) with excel components pasted (e.g. tables)) should use the following structure:

Deliverable	Description	Marks Allocated
Cover Page	Use Cover page from Course outline	
1. Executive Summary	In one page, the first paragraph should summarise the what, why, who and how of this project. Then summarise the results and findings of tasks 1, 2 and 3 in terms of the decision variables and key constraints. Write this as though you are writing for a business client (i.e. Poh) for whom you are performing the analysis. Close the summary by briefly listing and describing the other sections in your report.	5
2. Optimisation Model for Task 1	For Task 1, you should state clearly the objective function and constraints of the each optimisation model (Hint: follow the steps discussed in the lectures). Then you need to provide a summary of your key findings in terms of the decision variables and key constraints for each objective function analysed.	20
3. Optimisation Model for Task 2	For Task 2, you need to state the process (of running various optimisation models) you undertook to beat Julie's plan. You then need to justify the plan that you have chosen (as the best plan to defeat Julie) and make a comparative analysis as well. You may need to show certain tables of relevant information here. Again, summarise your key findings and results in terms of the decision variables and key constraints. You also need to highlight adjustments you made as you refined the model and provide a summary here.	30
4. Optimisation Model for Task 3	For Task 3, state the process of developing each optimisation model and how it was done in solver. Summarise each optimisation model in terms of decision variables and key constraints. Recommend one optimisation model which you think will help Poh steal and win this Masterchef Australia Buffet style Project once and for all.	30
5. Appendix	This section is where you include your WHAT-IF analyses using scenario manager to showcase each objective function as a scenario for Poh to decide what's best for her. (Hint: you first need to figure out all the possible scenarios for the decision variables based on different optimisation models).	10
6. Formatting & Writing	Good report writing, Formatting of excel components (e.g. tables, etc), formatting of report; professionalism counts.	5