A place for everything, everything in it place. -- Benjamin Franklin

Answer the questions related to each "chunk" of results taken from some hypothetical articles.

1) The design of this study was a 3 x 3 in which all variables were manipulated between subjects. There was a significant main effect of the first factor, $F(2, 333) = 5.77, p < .05$.

   How many subjects were used?

   342: A(2) + B(2) + AB(4) + Error(333) = n – 1 (341) = 341 + 1 = 342.

2) The design of this study was a 3 x 3 in which all variables were manipulated within subjects. There was a significant main effect of the first factor, $F(2, 248) = 11.21, p < .05$, and there was also a significant interaction, $F(4, 496) = 7.89, p < .05$.

   How many subjects were used?

   125: 248/2 = 124 or 496/4 = 124 = n – 1 = 124 + 1 = 125.

3) The design of this study was a 2 (time of day) x 4 (task difficulty) in which all variables were manipulated within subjects. The only significant finding was the interaction between time of day and task difficulty, $F(8, 72) = 1.01, p < .01$.

   Is there anything wrong with the above statements (if so, what)?

   1) df for numerator should be 3 (1x3), not 8 (2x4).

   2) Value of F being 1.01 *cannot* be significant; it's too close to 1.

   How many participants were used?

   25 participants: 72/3 = 24 = n – 1 = 24 + 1 = 25.

4) The design of this study was a 2 (gender) x 12 (month) in which all variables were manipulated between subjects. The only significant finding was the main effect of month, $F(6, 264) = 8.31, p > .05$.

   Is there anything wrong with the above statements (if so, what)?

   df for numerator should be 11 (12-1) not 6 AND should use "<".

   How many participants were used?

   Total df = A(1)+B(11)+AB(11)+Err(264) = 287 = n – 1 = 287 + 1 = 288 (12/condition).

5) The design of this study was a 3 x 5 in which 90 participants were tested. There was a significant main effect of the first factor, $F(2, 75) = 6.66, p < .05$.

   Was the design of this study within subjects or between subjects (how do you know)?

   Between: 75 df for error only works with between; within it would have to be 178.

   What are the total degrees of freedom in this study?

   89: Total scores are equal to total subjects: 90 – 1 = 89.

6) The design of this study was a 2 x 4 in which 10 participants were tested. There was a significant interaction, $F(3, 27) = 8.95, p < .05$.

   Was the design of this study within subjects or between subjects (how do you know)?

   Within: Not enough df for error if between.

   What are the total degrees of freedom in this study?

   79: Total scores are equal to subjects (10) x total conditions (8): 80 – 1 = 79.

7) There were 45 participants in this study. The design was a 3 (serving size) x 5 (food type).

What are the correct degrees of freedom for the main effects and the interaction if everything was manipulated between subjects?

The df for the "serving size" main effect are: $F(\underline{\ 2\ }, \underline{\ 30\ })$

The df for the "food type" main effect are: $F(\underline{\ 4\ }, \underline{\ 30\ })$

The df for the interaction: $F(\underline{\ 8\ }, \underline{\ 30\ })$

What are the correct degrees of freedom for the main effects and the interaction if everything was manipulated within subjects?

The df for the "serving size" main effect are: $F(\underline{\ 2\ }, \underline{\ 88\ })$

The df for the "food type" main effect are: $F(\underline{\ 4\ }, \underline{\ 176\ })$

The df for the interaction: $F(\underline{\ 8\ }, \underline{\ 352\ })$

8. While reading a very interesting research article, you come to the results section of an experiment performed by Gigglepants and Chucklebutt (2009) which describes a 2x2x4 within subjects ANOVA based on data (flavor ratings) from 60 subjects. The factors of this analysis included [A] *Portion Size* (small, large), [B] *Plate Shape* (round, square) as well as [C] *temperature of food* (frozen; room-temperature; warm; hot). The following F statistic regarding the three factor interaction is: $F(3, 98) = .66, p > .05.$

Based on the above, select the correct answer in Column B for each questions in Column A.

Column A		Column B
8.1 *Total* degrees of freedom:	_____(**E**)	A Cannot be determined.
		B Agree.
8.2 Degrees of freedom for		C Disagree.
Factor B:	_____(**Q**)	D 960
		E 959
8.3 Degrees of freedom for the		F 177
BxC interaction:	_____(**O**)	G 60
		H 59
8.4 Degrees of freedom for the		I 15
AxBxC interaction:	_____(**O**)	J 14
		K 7
8.5 The details of the reported F		L 6
statistic appear *correct*.	_____(**C**)	M 5
		N 4
8.6 The number of statistical tests		O 3
(main effects & interactions)		P 2
performed for this analysis are:	_____(**K**)	Q 1
		R 0
8.7 Degrees of freedom for the		
BxC interaction error term:	_____(**F**)	

9. For the following designs, (1) determine the number of unique conditions in the design, (2 – 4) please indicate the total number of participants that would be needed in order to have 30 subjects per condition, and (5a,b,c) specify the number of scores (pieces of data) each design yields.

NOTE: The first column should contain your response to the question of how many unique conditions are represented by the design.

Column two represents the assumption that the design was completely within subjects (i.e., a repeated measures design).

The third column represents the assumption that the design was completely between subjects (i.e., an independent groups design).

The fourth column represents the assumption that the design is a mixed design (with the underlined variables being the ones manipulated between subjects).

Designs	(1) Unique Conditions	(2) Within	(3) Between	(4) Mixed	(5 a, b, c) Pieces of DATA Within	Between	Mixed
2x3	6	30	180	60	180	180	180
2x5	10	30	300	60	300	300	300
3x5	15	30	450	90	450	450	450
2x4	8	30	240	120	240	240	240
4x5	20	30	600	120	600	600	600
5x6	30	30	900	180	900	900	900
2x7	14	30	420	60	420	420	420
2x6	12	30	360	180	360	360	360
2x3x3	18	30	540	180	540	540	540
2x4x4	32	30	960	60	960	960	960
3x4x5	60	30	1800	600	1800	1800	1800
2x4x5	40	30	1200	300	1200	1200	1200
2x5x8	80	30	2400	480	2400	2400	2400

Bonus:

Dr. Fuhluvherselph conducted a study using a 2x4x6 mixed design. She had 720 subjects total. Assuming 30 participants per condition, identify the variable manipulated within and between subjects. Circle "W" for within, or "B" for between for each variable below.   **[WxBxB]**

A (2 levels) = W or B   B (4 levels) = W or B   C (6 levels) = W or B