

EzCoach Problem Roulette Brenda Gunderson, Jared Tritz, Eujain Ting, Selwyn J. Kancharla, Barsaa Mohapatra, Kit Clement

Overview

This Problem Roulette Add-On piloted in Stats 250 provides students the opportunity to create **teaching solutions** for selected questions in Problem Roulette. These solutions are voted on by participants in a tournament style peer review process. Students are able to see all solutions in ranked order for all problems during the review phase.

The Framework



Contribution

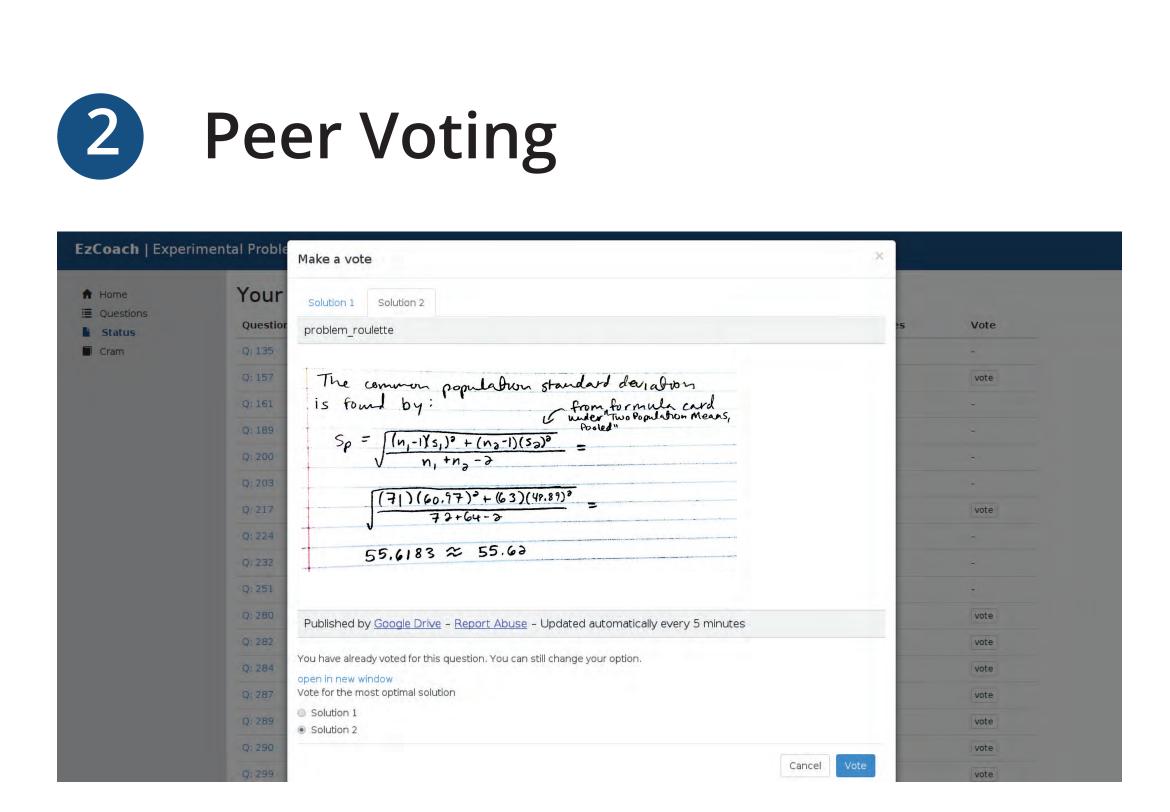
lome	Proble	ms												
Questions	Questions rer	maining: 1												
Cram	Stats 250 Exam 2 W12 Problem 2C										Optic	ons		
	Caffeine Consumption – Concerned about caffeine consumption by young adults, a doctor decides to investigate the caffeine consumption of college students and high school students. She randomly samples 72 college students (group 1) and 64 high school students (group 2) to investigate if the mean caffeine consumption (in mg) differs between college students and high school students. It has been a few years since she took her statistics course, so she uses Google to find a few commands in SPSS and obtains the output below:										A B C D			
		1	11.00					* D	Std. Err	Dr 1			Skip	Subr
		caffeine	student		N		an 5 3.73	td. Deviation 60.97	Mean	.19			(sear) (
		high school					9.84	48.89		5.11				
	-	Independent Samples Test												
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Levene's Test for Equality of Variances					Hest for Equality	of Means 85% Confidence Int		and the second			
						1	1203	Maso	Sth Euror	gi the Di	ference			
	caffeine Equi	ni variances	.714	5ig.	1.98	df 134	5/g (2-tailed) .0501	Mean Difference 18.89	Std. Enter Difference 9.56	Lower	Upper 37.79			
	3551	imed al variances not	,/ 14	.400	2.00	132.647	.0472	18.89	9.66	.23	37.55			
	using a 95%	% confider create th	nce inte e poole	erval. ed con	Basec fidenc	d on the e interv	result	s of Leve	ne's test	, she wi	ll use the	mption (college – high school) pooled procedure. on standard deviation must be		

Students may provide solutions to correctly answered questions. These solutions are useful learning references for other students about how to solve the question. Solutions are accepted in Google Doc or Youtube Video format.



imental Proble	Question 28	7				×
All Qu	Rank	Solution	Url	Wins	Losses	
Question	1	1	link	3	0	
116	2	2	link	1	1	
81	3	3	link	1	3	
39						
						Cancel
78	-	ĭ	-	2 View Solutions	_	_
38		1		0 View Salutions		
108		1		1 View Solutions		
74		1		0 View Solutions		
93		1		1 View Solutions		
71		1		0 View Solutions		
12		1		1 View Salutions		
91		1		0 View Salutions		
10		1		1 View Solutions		
63		1		0. View Salutians		
114		1		1 View Solutions		
42		1		1 view Solutions		
110		í		0 View Solutions	The second second second	

Submitted solutions are ranked based on the binary preference data. This helps students pick out the best solutions to study. Students can track how their submitted solutions are being evaluated.



Students are shown 2 solutions and asked to pick the best. Choices are treated as binary preferences, and used later in ordering. An algorithm selects solutions for comparison which maximizes the information gain.

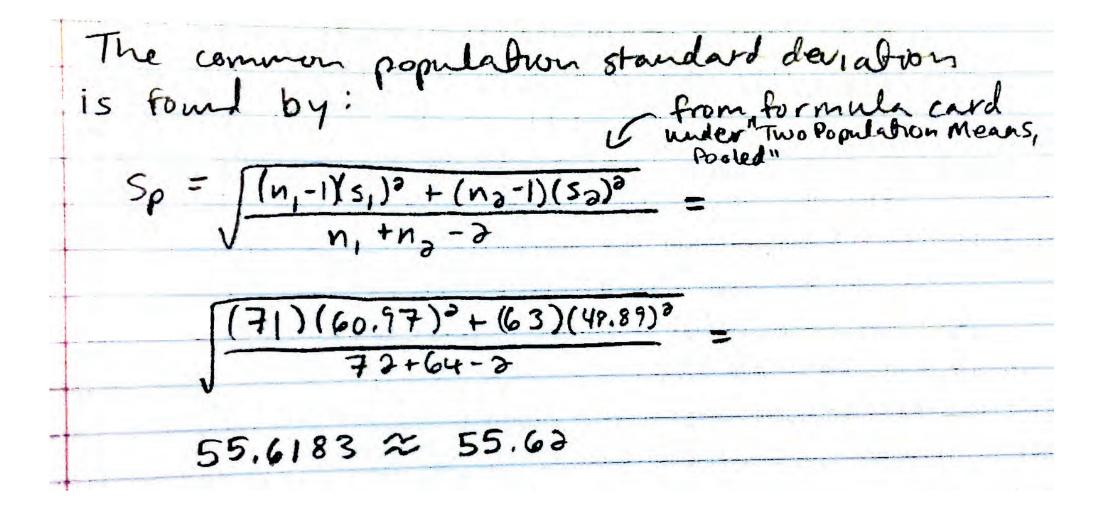
4 Review Phase

A Home ■ Questions	All Questions								
Status	Question	Pool	Total Solutions						
Cram	116	1	0 View Solutions						
	81	1	1 View Solutions						
	112	1	1 View Solutions						
	39	1	0 View Solutions						
	80.	1	1 View Solutions						
	78	1	2 View Solutions						
	38	1	0 View Solutions						
	108	1	1 View Solutions						
	74	1	0 View Solutions						
	93	1	1 View Solutions						
	71	1	0 View Solutions						
	12	1	1 View Solutions						
	91	1	0 View Solutions						
	10	1	1 View Solutions						
	63	1	0 View Solutions						
	114	1	1 View Solutions						

The final study period before the exam is the Review Phase. This interface shows all solutions to each question in ranked order. To encourage participation, students must pass a contribution threshold to gain access.

Voting Outcome

Solution 1



Solution 2

The estimate of the common population standard deviation can be calculated by the formula for finding Sp Sp = sqroot[($(72-1)*(60.97)^2$)+($(64-1)*(48.89)^2$)]/[72+64-2] Sp = 55.6184

So therefore estimate of the common population standard deviation is 55.62

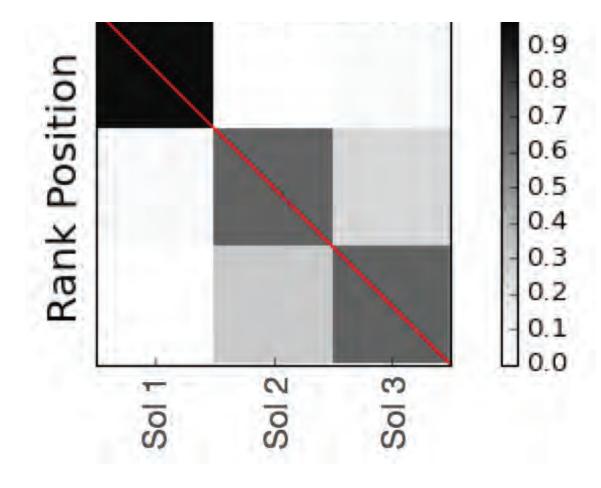
Solution 3

The question is asking for an estimate of the common population standard deviation, and we also know that we are going to be using pooled methods so if you visit the yellow card, under "Two Population Means" on page 2 you look under "Pooled" and find where it defines s_p and use that formula to find the answer.

$$\mathsf{s_p} = \sqrt{\frac{(n1-1)(s1)^2 - (n2-1)(s2)^2}{n1+n2-2}}$$

Rank Probability

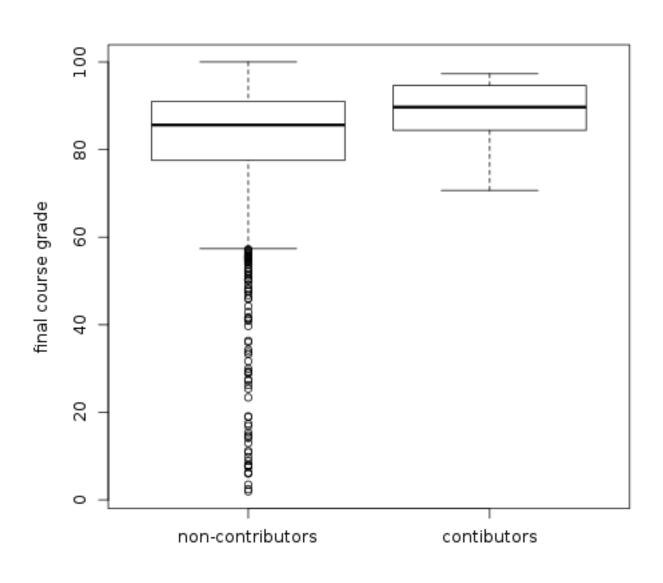
Rank probability is determined by iterative bootstrap resampling of the preferences submitted, ordering the bootstrap sample, and averaging over the rank position outcomes for each solution.



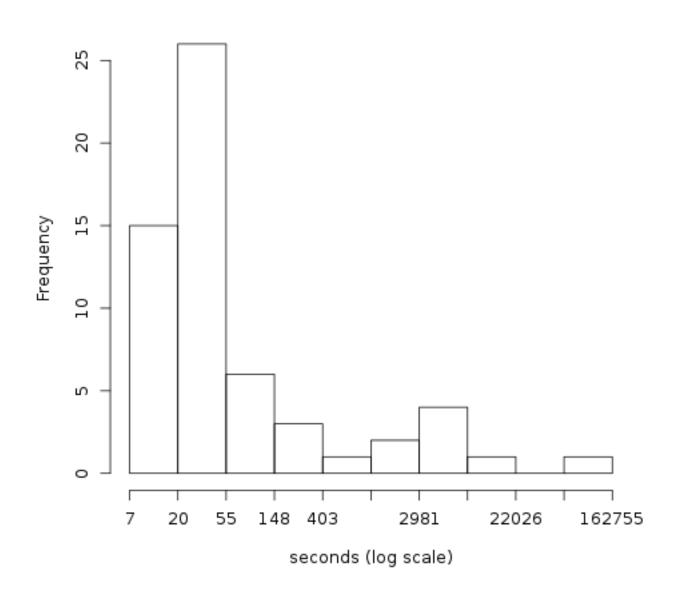
Findings

Selection Bias

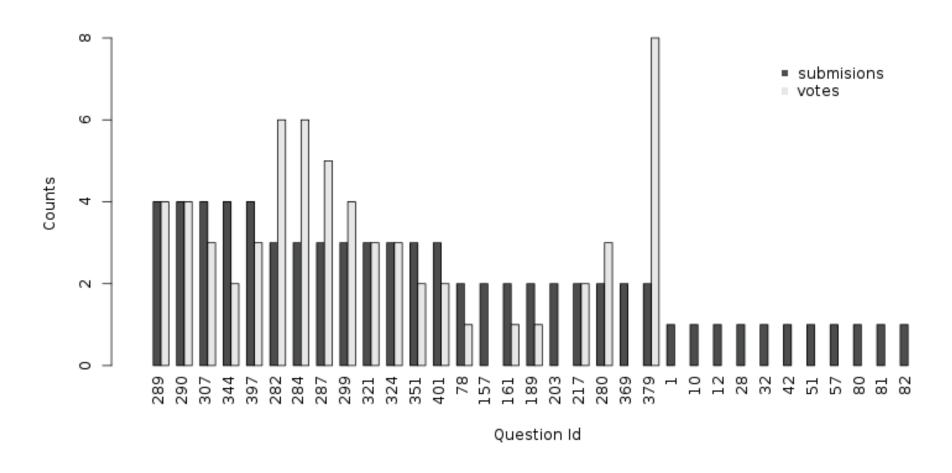
6.0 points @ 0.004 significance



Time Spent on Voting



Student Participation



Moving Forward

Explore incentive structures that increase participation. Enhance social learning with comments on solutions and requesting solutions to problems.