HOMEWORK 3
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Q. For the Montana State University case, determine the outcome of the test on the homepage. How did each wording option perform? What do you recommend the University do to improve the performance of the webpage? Provide your answer and reasoning in just a couple of sentences.

Impressions CTR
Control - INTERACT 5000 2.80%
Test A - LEARN 1000 1.70%
Test B -CONNECT 990 4%
Test C - HELP 997 2.60%
Test D - SERVICES 1001 4.70%
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Population	Impressions	CTR	Actual Clicks	Significance by t-test
Control	5000	2.8%	140	-
Test A	1000	1.7%	17	No
Test B	990	4%	40	No
Test C	997	2.6%	26	No
Test D	1001	4.70%	47	Yes

Considering Confidence level 99%
PTO…

Control (INTERACT) vs Test A (LEARN)

Confidence Limits (t tests): Split-run Test
(Response rate)

Input numbers in GREEN cells, results shown in blue

t values ($t_{a/2}$)

Confidence (1-a)	99%	95%	90%	80%	75%	70%
$t_{a/2}$	2.576	1.961	1.645	1.282	1.159	1.036

Choice of t value

99%	= Confidence level
2.576	

Test Results *(Input values into green cells - confidence limits are shown in blue)*

Recipe	Sample Size	Orders	Response Rate	standard deviation	Confidence limits for each group alone: confidence limit (+)	confidence limit (-)
Test A	1,000	17	1.70%	0.12927	2.753%	0.647%
Control	5,000	140	2.80%	0.16497	3.401%	2.199%
				0.15958	*= pooled standard deviation*	
				0.00553	*= standard deviation of (test - control)*	

Paired t-test (test-control)

Test - control	Confidence Interval (±)	Max difference (+)	Min difference (-)	% Gain	Confidence Limits for the difference in response rate (t-c): Max	Min
-1.100%	1.424%	0.324%	-2.524%	-39.3%	11.6%	-90.1%

Significant?

No

If the range from "Max" to "Min" includes zero -- if one value is positive and the other negative -- then the difference is not significant at that confidence level.

Control (INTERACT) vs Test B (CONNECT)

Confidence Limits (t tests): Split-run Test
(Response rate)

Input numbers in GREEN cells, results shown in blue

t values ($t_{a/2}$)

Confidence (1-a)	99%	95%	90%	80%	75%	70%
$t_{a/2}$	2.576	1.961	1.645	1.282	1.159	1.036

Choice of t value

99%	= Confidence level
2.576	

Test Results *(Input values into green cells - confidence limits are shown in blue)*

Recipe	Sample Size	Orders	Response Rate	standard deviation	confidence limit (+)	confidence limit (-)
					Confidence limits for each group alone	
Test B	990	40	4.04%	0.19690	5.652%	2.428%
Control	5,000	140	2.80%	0.16497	3.401%	2.199%
				0.17066	*= pooled standard deviation*	
				0.00594	*= standard deviation of (test - control)*	

Paired t-test (test-control)

Test - control	Confidence Interval (±)	Max difference (+)	Min difference (-)	% Gain	Max	Min
				Confidence Limits for the difference in response rate (t-c)		
1.240%	1.529%	2.770%	-0.289%	44.3%	98.9%	-10.3%

Significant?

No

If the range from "Max" to "Min" includes zero -- if one value is positive and the other negative -- then the difference is not significant at that confidence level.

Control (INTERACT) vs Test C (HELP)

Confidence Limits (t tests): Split-run Test
(Response rate)

Input numbers in GREEN cells, results shown in blue

t values ($t_{a/2}$)

Confidence (1-a)	99%	95%	90%	80%	75%	70%
$t_{a/2}$	2.576	1.961	1.645	1.282	1.159	1.036

Choice of t value

99%	= Confidence level
2.576	

Test Results *(Input values into green cells - confidence limits are shown in blue)*

Recipe	Sample Size	Orders	Response Rate	standard deviation	Confidence limits for each group alone: confidence limit (+)	confidence limit (-)
Test C	997	26	2.61%	0.15937	3.908%	1.308%
Control	5,000	140	2.80%	0.16497	3.401%	2.199%
				0.16405	*= pooled standard deviation*	
				0.00569	*= standard deviation of (test - control)*	

Paired t-test (test-control)

Test - control	Confidence Interval (±)	Max difference (+)	Min difference (-)	% Gain	Confidence Limits for the difference in response rate (t-c): Max	Min	*Significant?*
-0.192%	1.466%	1.274%	-1.658%	-6.9%	45.5%	-59.2%	No

If the range from "Max" to "Min" includes zero -- if one value is positive and the other negative -- then the difference is not significant at that confidence level.

Control (INTERACT) vs Test D (SERVICES)

Confidence Limits (t tests): Split-run Test
(Response rate)

Input numbers in GREEN cells, results shown in blue

t values ($t_{a/2}$)

Confidence (1-a)	99%	95%	90%	80%	75%	70%
$t_{a/2}$	2.576	1.961	1.645	1.282	1.159	1.036

Choice of t value

99%	= Confidence level
2.576	

Test Results *(Input values into green cells - confidence limits are shown in blue)*

Recipe	Sample Size	Orders	Response Rate	standard deviation	Confidence limits for each group alone: confidence limit (+)	confidence limit (-)
Test D	1,001	47	4.70%	0.21154	6.418%	2.973%
Control	5,000	140	2.80%	0.16497	3.401%	2.199%
				0.17360	*= pooled standard deviation*	
				0.00601	*= standard deviation of (test - control)*	

Paired t-test (test-control)

Test - control	Confidence Interval (±)	Max difference (+)	Min difference (-)	% Gain	Confidence Limits for the difference in response rate (t-c): Max	Min	*Significant?*
1.895%	1.549%	3.444%	0.347%	67.7%	123.0%	12.4%	Yes!

If the range from "Max" to "Min" includes zero -- if one value is positive and the other negative -- then the difference is not significant at that confidence level.

We conclude that the word Services is a preferred choice among users which achieved significant number of clicks.
Hence the word Services attracts users to click compared to other words.