2-Sample Comparisons: Which Procedure?

Problem	1	2	3	4	5	6	7
Simple Random Sample							
Independent Samples							
Normal Distribution							
Large Sample Size							
Equal σ 's							
Same Shape							
POOLED-T							
NON-POOLED-T							
PAIRED-T							
MANN-WHITNEY							
OTHER							

Instructions: Check off the criteria needed for the problems above. Use the procedures in your textbook to decide which procedure to use.

1. In deciding whether or not their test is gender biased, a testing group administers the exam to 20 randomly selected people, 8 women and 12 men. The test scores were:

Women	100	100	95	90	98	100	100	95				
Men	95	78	68	95	98	79	98	86	78	89	89	94

At the 5% significance level, is the test gender biased?

2. Trace metals in drinking water affect the flavor, and an unusually high concentration can pose a health hazard. Ten randomly selected samples were taken from a town reservoir, and measures of zinc concentration were recorded from both bottom water and surface water.

Zinc	1	2	3	4	5	6	7	8	9	10
Bottom	0.430	0.266	0.567	0.531	0.707	0.716	0.651	0.589	0.469	0.723
Surface	0.415	0.238	0.390	0.410	0.605	0.609	0.632	0.523	0.411	0.612

At the 1% significance level, does the data suggest that the concentration of zinc in the bottom water exceeds that of surface water?

3. In a packing plant, a machine packs cartons with jars. It is supposed that a new machine will pack faster on average than the old machine currently used. To test that hypothesis, the times it takes each machine to pack ten cartons are recorded. The results, in seconds, are shown in the following table.

New machine					Old machine				
42.1	41.3	42.4	43.2	41.8	42.7	43.8	42.5	43.1	44.0
41.0	41.8	42.8	42.3	42.7	43.6	43.3	43.5	41.7	44.1

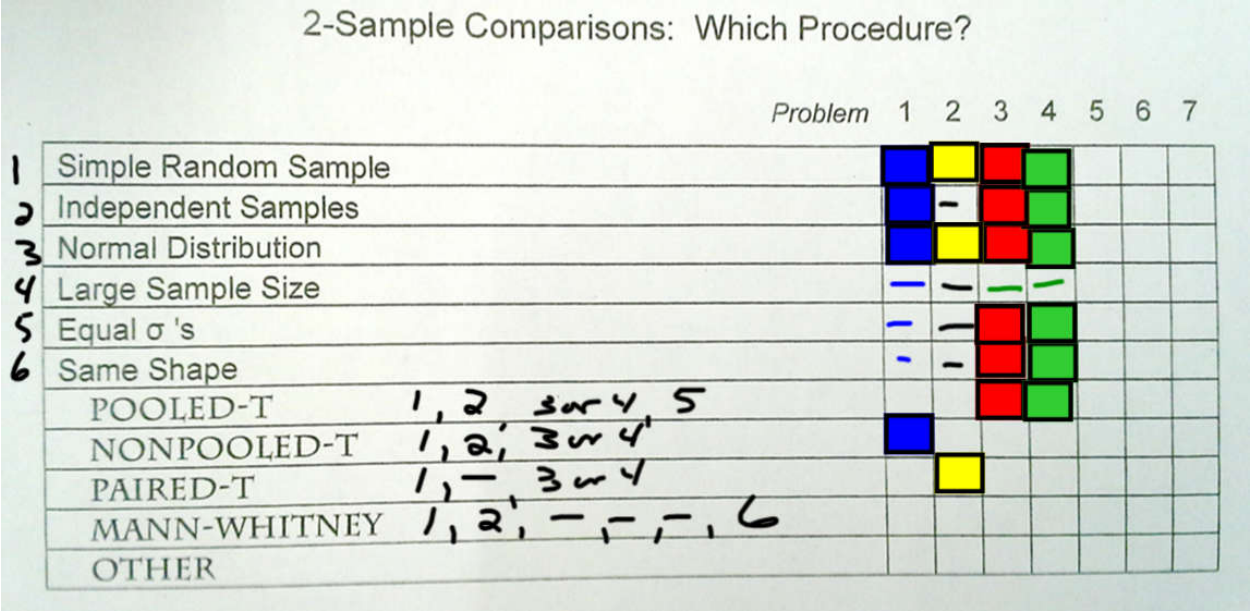
At the 5 % significance level, do the data provide sufficient evidence to conclude that, on the average, the new machine packs faster?

4. Twenty participants were given a list of 20 words to process. The 20 participants were randomly assigned to one of two treatment conditions. Half were instructed to count the number of vowels in each word (shallow processing). Half were instructed to judge whether the object described by each word would be useful if one were stranded on a desert island (deep processing). After a brief distractor task, all subjects were given a surprise free recall task. The number of words correctly recalled was recorded for each subject. Here are the data:

Shallow Processing:	13	12	11	9	11	13	14	14	14	15
Deep Processing:	12	15	14	14	13	12	15	14	16	17

Did participants using deep processing recall significantly more of the words? (Use alpha = .05)

Answers for the above problems



To help with other problems

2-Sample Comparisons: Which Procedure?

	Problem						
1. Simple Random Sample							
2. Independent Samples							
3. Normal Distribution							
4. Large Sample Size							
5. Equal σ 's							
6. Same Shape							
POOLED-T 1, 2, 3 OR 4, 5							
NON-POOLED-T 1, 2, 3 OR 4							
PAIRED-T 1, 3 OR 4							
MANN-WHITNEY 1, 2, 6							
OTHER							

Instructions: Check off the criteria needed for the problems. Use the procedures in your textbook to decide which to use.

Answers to problems:

1. nonpooled-t 2-tailed mean 1 =97.4 mean 2 = 87.25 stdev1 = 3.58 stdev2 = 9.602 t=3.322, p=0.0046

2. Paired-t right-tailed NPP ~ str line, t=4.864, p= 4.456E-4, mean=0.0804, stdev=0.0523,

3. pooled-t right-tailed NPP ~ str line, mean1=42.14, s1= 0.683; mean2= 43.23, s2=0.750, s1~s2 and n1=n2, sp= 0.717, t=-3.397 df=18, p=0.0016

When the **sample sizes are nearly equal** (admittedly "nearly equal" is somewhat ambiguous so often if sample sizes are small one requires they be equal), then a good **Rule of Thumb** to use is to see if this ratio falls from 0.5 to 2 (that is neither sample standard deviation is more than twice the other). If this rule of thumb is satisfied we can assume the variances are equal.

4.Mann-Whitney from source, but when we checked with normal probability plot, we decided both were approx. normally distributed and could use pooled-t. If use order given, the left-tailed; t = -2.066, p=0.027, df = 18, mean1=12.6, mean2=14.2, pooled s = 1.732