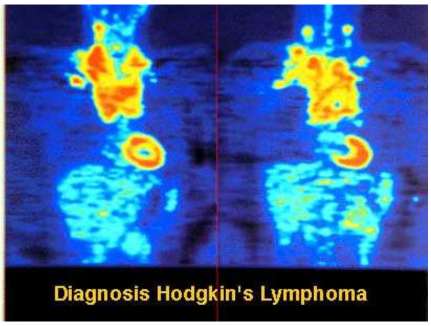
Part B-Home



Question 1: Hodgkin disease is a malignant condition characterised by enlarged lymph nodes, spleen and general lymphoid tissues. Patients suffering from this condition will require some form of radiation therapy to manage the symptoms. A new form of chemotherapy has been developed which claims to not have as many side effects as the traditional methods of chemo. The table provided summarises the measurements of the before and after biopsies for a sample of 10 patients suffering from Hodgkin lymphoma. We are interested in knowing if this new form of chemo affects the size of patient's lymphoid tissues. Report the results in APA format.

	Prior to treatment (µm)	After treatment (µm)	Difference (Δµm)
Mean (lymphoid size)	3.52	3.30	0.22
Std. Deviation	1.93	2.08	0.56

(a) State the null and alternative hypotheses for this scenario. Is this a one or two tailed test? (2 point)

(b) Using the critical value method, obtain a test statistic for this scenario (use $\alpha = 0.01$). (4 points)

(c) Obtain a 99% C.I. for this scenario. (4 points)

(d) Using your solutions to Questions **b.** and/or **c.**, state your conclusion for this scenario. (2 points)

Question 2:

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper			
Pair 1	Baseline Weight - Follow-up Weight	8.200	4.086	.914	6.288	10.112	8.975	19	.000

(a) State the p-value for this scenario. Is it significant? (1 point)

Question 3: **[MULTIPLE CHOICE]** A researcher wants to compare the weekly mean difference in sleep time of people when they exercise and when they don't exercise. Which of the following tests is most likely to be the appropriate Hypothesis test for this situation? (1 point)

(a) The two-sample t-test
(b) The one-sample t-test
(c) The one-sample Z-test
(d) The paired t-test

Question 4: **[MULTIPLE CHOICE]** The results of a paired *t*-test are given in the following SPSS output. (1 point)

ces				
95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
Lower	Upper			
6.288	10.112	8.975	19	.000

(a) As the 95% CI (6.288, 10.112) captures 1, we reject the null hypothesis.
(b) As the p-value = 8.975 is greater than 0.05, we must fail to reject the Null hypothesis
(c) As the p-value = 8.975 is less than 0.05, we must reject the Null hypothesis
(d) As the 95% CI (6.288, 10.112) does not capture 0, we must reject the null hypothesis

Question 5: **[MULTIPLE CHOICE]** The results of the appropriate Hypothesis test are given in the following SPSS output. Note that the researcher used the 0.05 level of significance. Also assume that the data is normally distributed in the population. (1 point)

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	95% Confidence Interval of the Difference Upper			
Pair 1	Baseline Weight - Follow-up Weight	8.200	4.086	.914	6.288	10.112	8.975	19	.000

(a) As the 95% CI of difference of means (6.288, 10.112) does not capture the Null hypothesised value of 0, we must reject the null hypothesis.
(b) As the p-value = 0.914 is less than the 0.05 level of significance, we must reject the Null hypothesis
(c) As the p-value = 0.914 is greater than the 0.05 level of significance, we must fail to reject the Null hypothesis
(d) As the 95% CI of the mean difference (6.288, 10.112) does not capture the Null hypothesised value of 0, we must reject the null hypothesis.
(e) As the 95% CI of the mean difference (6.288, 10.112) captures the Null hypothesised value of 0, we must fail to reject the null hypothesis.

Part B-Home

Question 1: **[MULTIPLE CHOICE]** A researcher wants to compare the mean hours spent sleeping between males and females. Which of the following tests is most likely to be the appropriate Hypothesis test for this situation? (1 point)

(a) The two-sample t-test
(b) The one-sample t-test
(c) The one-sample Z-test
(d) The paired t-test

Question 2: Consider the following two-sample test which was conducted to compare the body temperature of two groups of students. Group 1 undertook maths exam, and Group 2 listened music. Report the results in APA format.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Temperature	Equal variances assumed	.184	.679	-.995	8	.349	-.36000	.36194	-1.19463	.47463
	Equal variances not assumed			-.995	7.736	.350	-.36000	.36194	-1.19962	.47962

(a) Given that temperature = Group 1 – Group 2, determine from the output the *mean difference* in temperature from the two groups. (1 point)

(b) Are the variances equivalent, using Levene's test, for the two groups? Why or why not? (2 points)

(c) Are the two population means equal for temperature based on this sample? Why or why not? (2 points)

<u>Question 3:</u> It has been hypothesized that the mean pulse rate for college students is about 72 beats per minute. A sample of college students recorded their gender and pulse rates. Assuming that all assumptions have been met, test whether there is a significant difference between males and females for pulse rate. The summary statistics are presented in the table below. Report the results in APA format. (10 points)

Gender	***n***	**Mean**	**St.dev**
Female	20	76.9	11.6
Male	20	70.42	9.95

Part B-Home

Question 1: Blood pressure measurements taken on the left and right arms of a person are assumed to be comparable. To test this assumption, 10 volunteers are obtained and systolic blood pressure readings are taken simultaneously on both arms by the same two different observers for all ten volunteers. Report the results in APA format.

(a) What type of statistical test should be conducted? Why? (2 points)

(b) State the null and alternative hypotheses for this scenario. (2 points)

The results of this study are provided in the tables below:

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		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	BP_LEFT_ARM	124.70	10	18.191	5.752
	BP_RIGHT_ARM	123.20	10	17.681	5.591

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	BP_LEFT_ARM - BP_RIGHT_ARM	1.500	3.979	1.258	-1.346	4.346	1.192	9	.264

(c) State the *p*-value for this scenario. Is it significant? (2 points)

(d) Determine the critical *t* value for this scenario (using your *t*-tables). Compare this with the calculated *t*-value from the output provided. Are these results significant? (3 points)

(e) State the 95% confidence interval for this scenario. Are these results significant? (2 points)

(f) What type of conclusion can the researcher make based upon these results? (2 points)

Question 2: **[MULTIPLE CHOICE]** A study was conducted to examine the relationship between amount of hair and intelligence. Results indicated a CI of (3.61, 7.45), with a mean value of 6.49. (1 point)

a) Reject H_0 because the CI captures the mean value 6.49
b) Reject H_0 because the CI does not captures the mean value 6.49
c) Fail to reject H_0 because the CI captures the mean value 6.49
d) Fail to reject H_0 because the CI does not capture the mean value 6.49

Question 3: **[MULTIPLE CHOICE]** (1 point) If the *p*-value is greater than the significance level in a hypothesis test then

a) You reject H0 and conclude the data are statistically significantly different.
b) You fail to reject H0 and conclude the data are statistically significantly different.
c) You reject H0 and conclude the data are not statistically significantly different.
d) You fail to reject H0 and conclude the data are not statistically significantly different.

Question 4: **[MULTIPLE CHOICE]** (1 point) A test has been conducted to determine if Green tea has an effect for lowering cholesterol in obese individuals. Participants were gathered and randomly allocated into a treatment (n = 45) and placebo (n = 38) group. The most appropriate null hypothesis for this scenario is:

a) Drinking green tea does not lower cholesterol levels in obese individuals.
b) Drinking green tea does lower cholesterol in obese individuals.
c) There is a significant difference between the treatment and control groups for cholesterol levels.
d) None of the above.

Z-distribution values										
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
+0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
+0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
+0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
+0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
+0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
+0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
+0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
+0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
+0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
+0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
+1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
+1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
+1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
+1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
+1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
+1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
+1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
+1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
+1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
+1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
+2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
+2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
+2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
+2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
+2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
+2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
+2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
+2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
+2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
+2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
+3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990

Z-distribution values										
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
-0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

t-distribution Critical values									
two-tail	0.5000	0.2000	0.1000	0.0500	0.0200	0.0100	0.0050	0.0020	0.0010
one-tail	0.2500	0.1000	0.0500	0.0250	0.0100	0.0050	0.0025	0.0010	0.0005
1	1.0000	3.0777	6.3138	12.7062	31.8205	63.6567	127.3213	318.3088	636.6192
2	0.8165	1.8856	2.9200	4.3027	6.9646	9.9248	14.0890	22.3271	31.5991
3	0.7649	1.6377	2.3534	3.1824	4.5407	5.8409	7.4533	10.2145	12.9240
4	0.7407	1.5332	2.1318	2.7764	3.7469	4.6041	5.5976	7.1732	8.6103
5	0.7267	1.4759	2.0150	2.5706	3.3649	4.0321	4.7733	5.8934	6.8688
6	0.7176	1.4398	1.9432	2.4469	3.1427	3.7074	4.3168	5.2076	5.9588
7	0.7111	1.4149	1.8946	2.3646	2.9980	3.4995	4.0293	4.7853	5.4079
8	0.7064	1.3968	1.8595	2.3060	2.8965	3.3554	3.8325	4.5008	5.0413
9	0.7027	1.3830	1.8331	2.2622	2.8214	3.2498	3.6897	4.2968	4.7809
10	0.6998	1.3722	1.8125	2.2281	2.7638	3.1693	3.5814	4.1437	4.5869
11	0.6974	1.3634	1.7959	2.2010	2.7181	3.1058	3.4966	4.0247	4.4370
12	0.6955	1.3562	1.7823	2.1788	2.6810	3.0545	3.4284	3.9296	4.3178
13	0.6938	1.3502	1.7709	2.1604	2.6503	3.0123	3.3725	3.8520	4.2208
14	0.6924	1.3450	1.7613	2.1448	2.6245	2.9768	3.3257	3.7874	4.1405
15	0.6912	1.3406	1.7531	2.1314	2.6025	2.9467	3.2860	3.7328	4.0728
16	0.6901	1.3368	1.7459	2.1199	2.5835	2.9208	3.2520	3.6862	4.0150
17	0.6892	1.3334	1.7396	2.1098	2.5669	2.8982	3.2224	3.6458	3.9651
18	0.6884	1.3304	1.7341	2.1009	2.5524	2.8784	3.1966	3.6105	3.9216
19	0.6876	1.3277	1.7291	2.0930	2.5395	2.8609	3.1737	3.5794	3.8834
df 20	0.6870	1.3253	1.7247	2.0860	2.5280	2.8453	3.1534	3.5518	3.8495
21	0.6864	1.3232	1.7207	2.0796	2.5176	2.8314	3.1352	3.5272	3.8193
22	0.6858	1.3212	1.7171	2.0739	2.5083	2.8188	3.1188	3.5050	3.7921
23	0.6853	1.3195	1.7139	2.0687	2.4999	2.8073	3.1040	3.4850	3.7676
24	0.6848	1.3178	1.7109	2.0639	2.4922	2.7969	3.0905	3.4668	3.7454
25	0.6844	1.3163	1.7081	2.0595	2.4851	2.7874	3.0782	3.4502	3.7251
30	0.6828	1.3104	1.6973	2.0423	2.4573	2.7500	3.0298	3.3852	3.6460
40	0.6807	1.3031	1.6839	2.0211	2.4233	2.7045	2.9712	3.3069	3.5510
50	0.6794	1.2987	1.6759	2.0086	2.4033	2.6778	2.9370	3.2614	3.4960
60	0.6786	1.2958	1.6706	2.0003	2.3901	2.6603	2.9146	3.2317	3.4602
Z	0.0000	1.2816	1.6449	1.9600	2.3263	2.5758	2.8070	3.0902	3.2905
CI Level	50.00%	80.00%	90.00%	95.00%	98.00%	99.00%	99.50%	99.80%	99.90%