

MATH 203: PRINCIPLES OF STATISTICS 1
FALL 2024

EXERCISES ON HYPOTHESIS TESTING IN TWO SAMPLE PROBLEMS

Carry out the following two sample hypothesis tests:

Problem	Parameter	m	$\bar{x}$ or x	s_1 or s_d	n	$\bar{y}$ or y	s_2	α	H_a
1	$p_1 - p_2$	128	17		131	60		0.05	$p_1 > p_2$
2	$p_1 - p_2$	131	26		169	135		0.05	$p_1 < p_2$
3	$\mu_1 - \mu_2$	7	2.34	2.04	20	-1.54	2.22	0.10	$\mu_1 < \mu_2$
4	μ_d	20	-0.14	1.57	20	1.93		0.01	$\mu_1 < \mu_2$
5	$\mu_1 - \mu_2$	19	2.27	1.13	13	-0.36	0.92	0.05	$\mu_1 < \mu_2$
6	$\mu_1 - \mu_2$	86	0.95	2.19	98	-0.09	2.32	0.01	$\mu_1 > \mu_2$
7	$\mu_1 - \mu_2$	19	4.07	2.50	20	-1.27	2.85	0.05	$\mu_1 \neq \mu_2$
8	μ_d	10	0.62	7.72	10	5.14		0.05	$\mu_1 > \mu_2$
9	$p_1 - p_2$	53	3		44	12		0.05	$p_1 > p_2$
10	μ_d	12	2.24	1.35	12	2.88		0.10	$\mu_1 > \mu_2$
11	$\mu_1 - \mu_2$	10	-0.48	2.10	13	0.86	1.83	0.05	$\mu_1 < \mu_2$
12	$\mu_1 - \mu_2$	74	-1.93	1.95	64	-3.97	2.12	0.10	$\mu_1 > \mu_2$
13	$\mu_1 - \mu_2$	9	4.41	1.50	16	-1.25	1.59	0.05	$\mu_1 < \mu_2$
14	μ_d	18	-2.01	1.91	18	2.45		0.10	$\mu_1 > \mu_2$
15	$p_1 - p_2$	89	39		193	163		0.05	$p_1 \neq p_2$
16	$\mu_1 - \mu_2$	12	-2.99	1.57	18	5.10	1.47	0.10	$\mu_1 < \mu_2$
17	$\mu_1 - \mu_2$	19	-4.94	1.14	19	-2.25	1.4	0.01	$\mu_1 \neq \mu_2$
18	μ_d	17	-1.92	2.70	17	1.86		0.05	$\mu_1 \neq \mu_2$
19	$\mu_1 - \mu_2$	48	0.76	1.77	41	0.02	1.64	0.01	$\mu_1 < \mu_2$
20	$\mu_1 - \mu_2$	63	3.18	2.09	42	3.97	2.27	0.05	$\mu_1 < \mu_2$
21	$\mu_1 - \mu_2$	95	-2.76	1.27	84	2.30	1.22	0.05	$\mu_1 \neq \mu_2$
22	$p_1 - p_2$	172	72		139	43		0.05	$p_1 < p_2$
23	$p_1 - p_2$	161	36		183	84		0.05	$p_1 > p_2$
24	$\mu_1 - \mu_2$	67	1.05	2.15	49	4.94	1.83	0.10	$\mu_1 < \mu_2$
25	$\mu_1 - \mu_2$	6	2.08	1.11	5	-2.35	0.42	0.10	$\mu_1 < \mu_2$

Problem	Parameter	m	$\bar{x}$ or x	s_1 or s_d	n	$\bar{y}$ or y	s_2	α	H_a
26	$p_1 - p_2$	107	60		104	49		0.05	$p_1 > p_2$
27	μ_d	12	-1.97	3.03	12	-1.54		0.10	$\mu_1 > \mu_2$
28	$p_1 - p_2$	59	4		138	44		0.10	$p_1 > p_2$
29	$p_1 - p_2$	145	58		44	25		0.01	$p_1 \neq p_2$
30	μ_d	14	-4.05	2.23	14	1.00		0.10	$\mu_1 > \mu_2$
31	μ_d	10	1.93	2.08	10	1.98		0.05	$\mu_1 > \mu_2$
32	$\mu_1 - \mu_2$	10	3.24	0.38	17	3.65	1.04	0.10	$\mu_1 \neq \mu_2$
33	μ_d	12	-2.63	4.41	12	-2.31		0.10	$\mu_1 < \mu_2$
34	μ_d	10	-2.63	1.16	10	4.26		0.10	$\mu_1 < \mu_2$
35	μ_d	13	0.51	3.95	13	1.46		0.10	$\mu_1 < \mu_2$
36	$\mu_1 - \mu_2$	12	-2.96	2.05	20	-3.59	2.43	0.01	$\mu_1 > \mu_2$
37	μ_d	20	-0.78	3.69	20	1.87		0.10	$\mu_1 > \mu_2$
38	μ_d	11	1.68	1.58	11	0.59		0.10	$\mu_1 > \mu_2$
39	$\mu_1 - \mu_2$	88	2.28	1.34	85	1.09	1.4	0.01	$\mu_1 > \mu_2$
40	$\mu_1 - \mu_2$	73	3.24	2.31	74	4.42	2.56	0.10	$\mu_1 > \mu_2$
41	μ_d	18	-4.80	2.13	18	0.98		0.05	$\mu_1 \neq \mu_2$
42	μ_d	10	2.92	3.32	10	3.25		0.10	$\mu_1 \neq \mu_2$
43	$\mu_1 - \mu_2$	15	0.78	1.71	6	-4.27	3.15	0.10	$\mu_1 < \mu_2$
44	$\mu_1 - \mu_2$	70	-4.17	2.57	42	-1.86	2.41	0.05	$\mu_1 \neq \mu_2$
45	$\mu_1 - \mu_2$	53	3.41	0.44	45	-1.00	0.57	0.10	$\mu_1 > \mu_2$
46	$\mu_1 - \mu_2$	56	-0.14	2.36	41	-0.90	2.06	0.10	$\mu_1 < \mu_2$
47	$\mu_1 - \mu_2$	59	-1.97	2.03	41	3.12	1.8	0.10	$\mu_1 \neq \mu_2$
48	μ_d	8	-1.29	3.60	8	0.10		0.05	$\mu_1 < \mu_2$
49	$\mu_1 - \mu_2$	68	-0.98	1.78	60	0.16	1.77	0.05	$\mu_1 < \mu_2$
50	$p_1 - p_2$	51	15		104	80		0.01	$p_1 \neq p_2$

Solutions: The value labelled 'Crit.' is the boundary of the Rejection Region. The results that Reject H_0 are indicated.

	Param.	m	$\bar{x}$ or x	s_1 or s_d	n	$\bar{y}$ or y	s_2	α	H_a	T_{obs}	Crit.	Result
1	$p_1 - p_2$	128	17		131	60		0.05	$p_1 > p_2$	-6.152	1.645	
2	$p_1 - p_2$	131	26		169	135		0.05	$p_1 < p_2$	-12.902	-1.645	Reject
3	$\mu_1 - \mu_2$	7	2.34	2.04	20	-1.54	2.22	0.10	$\mu_1 < \mu_2$	4.056	-1.316	
4	μ_d	20	-0.14	1.57	20	1.93		0.01	$\mu_1 < \mu_2$	-5.896	-2.539	Reject
5	$\mu_1 - \mu_2$	19	2.27	1.13	13	-0.36	0.92	0.05	$\mu_1 < \mu_2$	6.952	-1.697	
6	$\mu_1 - \mu_2$	86	0.95	2.19	98	-0.09	2.32	0.01	$\mu_1 > \mu_2$	3.126	2.326	Reject
7	$\mu_1 - \mu_2$	19	4.07	2.50	20	-1.27	2.85	0.05	$\mu_1 \neq \mu_2$	6.207	2.026	Reject
8	μ_d	10	0.62	7.72	10	5.14		0.05	$\mu_1 > \mu_2$	-1.851	1.833	
9	$p_1 - p_2$	53	3		44	12		0.05	$p_1 > p_2$	-2.910	1.645	
10	μ_d	12	2.24	1.35	12	2.88		0.10	$\mu_1 > \mu_2$	-1.642	1.363	
11	$\mu_1 - \mu_2$	10	-0.48	2.10	13	0.86	1.83	0.05	$\mu_1 < \mu_2$	-1.633	-1.721	
12	$\mu_1 - \mu_2$	74	-1.93	1.95	64	-3.97	2.12	0.10	$\mu_1 > \mu_2$	5.850	1.282	Reject
13	$\mu_1 - \mu_2$	9	4.41	1.50	16	-1.25	1.59	0.05	$\mu_1 < \mu_2$	8.712	-1.714	
14	μ_d	18	-2.01	1.91	18	2.45		0.10	$\mu_1 > \mu_2$	-9.907	1.333	
15	$p_1 - p_2$	89	39		193	163		0.05	$p_1 \neq p_2$	-6.922	1.960	Reject
16	$\mu_1 - \mu_2$	12	-2.99	1.57	18	5.10	1.47	0.10	$\mu_1 < \mu_2$	-14.375	-1.313	Reject
17	$\mu_1 - \mu_2$	19	-4.94	1.14	19	-2.25	1.4	0.01	$\mu_1 \neq \mu_2$	-6.495	2.719	Reject
18	μ_d	17	-1.92	2.70	17	1.86		0.05	$\mu_1 \neq \mu_2$	-5.772	2.120	Reject
19	$\mu_1 - \mu_2$	48	0.76	1.77	41	0.02	1.64	0.01	$\mu_1 < \mu_2$	2.046	-2.326	
20	$\mu_1 - \mu_2$	63	3.18	2.09	42	3.97	2.27	0.05	$\mu_1 < \mu_2$	-1.803	-1.645	Reject
21	$\mu_1 - \mu_2$	95	-2.76	1.27	84	2.30	1.22	0.05	$\mu_1 \neq \mu_2$	-27.165	1.960	Reject
22	$p_1 - p_2$	172	72		139	43		0.05	$p_1 < p_2$	2.011	-1.645	
23	$p_1 - p_2$	161	36		183	84		0.05	$p_1 > p_2$	-4.770	1.645	
24	$\mu_1 - \mu_2$	67	1.05	2.15	49	4.94	1.83	0.10	$\mu_1 < \mu_2$	-10.497	-1.282	Reject
25	$\mu_1 - \mu_2$	6	2.08	1.11	5	-2.35	0.42	0.10	$\mu_1 < \mu_2$	8.376	-1.383	

	Param.	m	$\bar{x}$ or x	s_1 or s_d	n	$\bar{y}$ or y	s_2	α	H_a	T_{obs}	Crit.	Result
26	$p_1 - p_2$	107	60		104	49		0.05	$p_1 > p_2$	1.307	1.645	
27	μ_d	12	-1.97	3.03	12	-1.54		0.10	$\mu_1 > \mu_2$	-0.492	1.363	
28	$p_1 - p_2$	59	4		138	44		0.10	$p_1 > p_2$	-4.881	1.282	
29	$p_1 - p_2$	145	58		44	25		0.01	$p_1 \neq p_2$	-1.978	2.576	
30	μ_d	14	-4.05	2.23	14	1.00		0.10	$\mu_1 > \mu_2$	-8.473	1.350	
31	μ_d	10	1.93	2.08	10	1.98		0.05	$\mu_1 > \mu_2$	-0.076	1.833	
32	$\mu_1 - \mu_2$	10	3.24	0.38	17	3.65	1.04	0.10	$\mu_1 \neq \mu_2$	-1.193	1.708	
33	μ_d	12	-2.63	4.41	12	-2.31		0.10	$\mu_1 < \mu_2$	-0.251	-1.363	
34	μ_d	10	-2.63	1.16	10	4.26		0.10	$\mu_1 < \mu_2$	-18.783	-1.383	Reject
35	μ_d	13	0.51	3.95	13	1.46		0.10	$\mu_1 < \mu_2$	-0.867	-1.356	
36	$\mu_1 - \mu_2$	12	-2.96	2.05	20	-3.59	2.43	0.01	$\mu_1 > \mu_2$	0.751	2.457	
37	μ_d	20	-0.78	3.69	20	1.87		0.10	$\mu_1 > \mu_2$	-3.212	1.328	
38	μ_d	11	1.68	1.58	11	0.59		0.10	$\mu_1 > \mu_2$	2.288	1.372	Reject
39	$\mu_1 - \mu_2$	88	2.28	1.34	85	1.09	1.4	0.01	$\mu_1 > \mu_2$	5.708	2.326	Reject
40	$\mu_1 - \mu_2$	73	3.24	2.31	74	4.42	2.56	0.10	$\mu_1 > \mu_2$	-2.935	1.282	
41	μ_d	18	-4.80	2.13	18	0.98		0.05	$\mu_1 \neq \mu_2$	-11.513	2.110	Reject
42	μ_d	10	2.92	3.32	10	3.25		0.10	$\mu_1 \neq \mu_2$	-0.314	1.833	
43	$\mu_1 - \mu_2$	15	0.78	1.71	6	-4.27	3.15	0.10	$\mu_1 < \mu_2$	4.789	-1.328	
44	$\mu_1 - \mu_2$	70	-4.17	2.57	42	-1.86	2.41	0.05	$\mu_1 \neq \mu_2$	-4.789	1.960	Reject
45	$\mu_1 - \mu_2$	53	3.41	0.44	45	-1.00	0.57	0.10	$\mu_1 > \mu_2$	42.293	1.282	Reject
46	$\mu_1 - \mu_2$	56	-0.14	2.36	41	-0.90	2.06	0.10	$\mu_1 < \mu_2$	1.687	-1.282	
47	$\mu_1 - \mu_2$	59	-1.97	2.03	41	3.12	1.8	0.10	$\mu_1 \neq \mu_2$	-13.192	1.645	Reject
48	μ_d	8	-1.29	3.60	8	0.10		0.05	$\mu_1 < \mu_2$	-1.092	-1.895	
49	$\mu_1 - \mu_2$	68	-0.98	1.78	60	0.16	1.77	0.05	$\mu_1 < \mu_2$	-3.627	-1.645	Reject
50	$p_1 - p_2$	51	15		104	80		0.01	$p_1 \neq p_2$	-6.251	2.576	Reject