

NO	MOVIE_NAME	YEAR	RATING	LENGTH	GENRE	SCORE
1	The Shawshank Redem	1994	R	142	Drama	9.3
2	The Godfather	1972	R	175	Crime, Drama	9.2
3	The Dark Knight	2008	PG-13	152	Action, Crime,	9
4	The Godfather: Part II	1974	R	202	Crime, Drama	9
5	The Lord of the Rings:	2003	PG-13	201	Action, Advent	8.9

Problem - We want to compare the average length of PG vs. PG-13 films

Step 1 - Test equality of variances

Step 2 - Test equality of means

1. filter only PG and PG-13 films

NO	MOVIE_NAME	RATING	LENGTH
3	The Dark Knight	PG-13	152
5	The Lord of the Rings:	PG-13	201
9	Inception	PG-13	148
11	The Lord of the Rings:	PG-13	178
12	Forrest Gump	PG-13	142
14	Hamilton	PG-13	160
15	The Lord of the Rings:	PG-13	179
18	Star Wars: Episode V -	PG	124
21	Interstellar	PG-13	169
23	Spirited Away	PG	125
26	Life Is Beautiful	PG-13	116
29	Star Wars: Episode IV -	PG	121
32	It's a Wonderful Life	PG	130
36	The Prestige	PG-13	130
47	Back to the Future	PG	116
49	Once Upon a Time in th	PG-13	165
51	Casablanca	PG	102
56	Your Name.	PG	106
58	Spider-Man: Into the Sp	PG	117
59	Avengers: Endgame	PG-13	181
60	Avengers: Infinity War	PG-13	149
61	Coco	PG	105
63	The Dark Knight Rises	PG-13	164
64	3 Idiots	PG-13	170
65	Taare Zameen Par	PG	165
70	Princess Mononoke	PG-13	134
72	Raiders of the Lost Ark	PG	115
77	Dr. Strangelove or: How	PG	95
80	Rear Window	PG	112
89	A Separation	PG-13	123

2. Random sampling

Sample	Length		<input checked="" type="checkbox"/>
	PG	PG-131	
1	102.9	152.5	49.6
2	98.3	200.3	102.0
3	104.5	182.3	77.9
4	112.1	127.9	15.9
5	125.2	176.8	51.6
6	104.3	155.4	51.0
7	136.9	150.9	14.0
8	116.7	168.6	51.9
9	140.8	183.0	42.2
10	123.9	151.5	27.6
11	138.1	133.9	-4.2
12	112.0	166.8	54.8
13	113.9	128.3	14.5
14	135.8	156.9	21.1
15	109.0	196.2	87.2
16	124.2	152.5	28.2
17	122.1	175.0	53.0
18	118.7	137.4	18.7
19	82.8	157.1	74.3
20	102.6	128.4	25.7
21	125.9	116.0	-10.0
22	114.9	182.3	67.4
23	86.2	163.8	77.6
24	101.5	190.7	89.1
25	101.9	176.8	74.9
26	110.6	160.3	49.7
27	126.0	130.1	4.1
28	128.1	184.9	56.8
29	121.5	172.8	51.3
30	119.1	163.6	44.5
31	113.7	195.1	81.4
32	117.5	101.6	-15.9
33	135.2	132.8	-2.3
34	101.4	114.1	12.8
35	117.4	153.9	36.5

	PG	PG-13
VARIANCES	299.5769231	522.3897059
MEAN	117.9230769	156.5294118

36	97.0	134.0	37.0
37	96.9	122.4	25.5
38	107.4	172.7	65.4
39	89.5	139.6	50.1
40	126.5	156.5	29.9
41	110.0	145.5	35.6
42	123.3	118.1	-5.2
43	101.8	150.2	48.4
44	119.8	153.2	33.4
45	121.1	126.1	5.0
46	104.9	146.7	41.8
47	131.5	138.1	6.7
48	142.2	168.2	26.0
49	113.6	165.6	52.0
50	119.9	166.6	46.6
51	104.0	148.3	44.2
52	132.2	193.5	61.3
53	103.1	164.5	61.4
54	111.2	143.2	32.1
55	80.2	106.0	25.8
56	122.3	166.2	43.8
57	136.3	161.9	25.6
58	89.0	160.0	71.0
59	127.5	119.9	-7.6
60	118.8	200.5	81.7
61	136.0	164.7	28.7
62	106.3	187.1	80.8
63	117.1	154.4	37.3
64	81.8	165.3	83.5
65	117.6	174.1	56.6
66	122.8	167.8	45.0
67	148.7	178.3	29.5
68	110.4	133.1	22.7
69	92.0	162.2	70.2
70	104.2	117.2	13.0
71	105.6	159.5	53.8
72	85.3	192.1	106.8
73	157.1	159.4	2.3
74	115.1	157.3	42.2
75	103.4	190.6	87.2
76	98.5	161.9	63.4
77	128.7	207.7	79.0
78	125.2	136.1	10.9
79	100.8	180.1	79.2
80	141.9	178.8	36.9
81	124.6	149.8	25.3
82	108.0	158.4	50.5
83	116.5	129.9	13.3
84	109.6	133.6	24.0
85	104.2	216.5	112.3
86	91.4	144.4	53.0
87	116.1	213.8	97.7
88	125.2	164.1	38.9
89	111.0	144.0	33.0
90	116.7	155.4	38.8
91	127.0	149.2	22.2
92	129.1	152.1	23.0
93	130.4	126.8	-3.5
94	115.2	212.9	97.8
95	141.6	163.5	21.9
96	100.5	170.8	70.3
97	103.2	143.6	40.4
98	132.1	159.9	27.8
99	112.7	167.0	54.3
100	123.1	123.2	0.0

3.Test equality of variances

F.TEST **Reject H0** IF p-value <= 0.05, reject H0
H0: equal vars assumed
H1: equal vars not assumed

4.Test equality of mean

T.TEST **Reject H0** IF p-value <= 0.05, reject H0
H0: mean PG = mean PG-13
H1: mean PG != mean PG-13

FORMULATEXT

=IF(F.TEST(\$B\$48:\$B\$147,\$C\$48:\$C\$147) <= 0.05, "Reject H0", "Failed to reject H0")

=IF(T.TEST(\$B\$48:\$B\$147,\$C\$48:\$C\$147,2,3) <= 0.05, "Reject H0", "Failed to reject H0")