Summary:

Comparison of results between Lagrange Interpolation method and Newton' s Interpolation method.

I have selected the average temperatures daily in 2016 as data. I have set days as xs, AvgTemp as ys. (from http://climod.unl.edu/ type **Daily Data Listing** area **68508**)

- Data chart

date	days	AvgTemp
1/1/2016	1	24.9
1/2/2016	2	24.8
1/3/2016	3	24.8
1/4/2016	4	24.7
1/5/2016	5	24.7
1/6/2016	6	24.6
1/7/2016	7	24.5
1/8/2016	8	24.5
1/9/2016	9	24.4
1/10/2016	10	24.4
1/11/2016	11	24.3
1/12/2016	12	24.3
1/13/2016	13	24.2
1/14/2016	14	24.2
1/15/2016	15	24.2
1/16/2016	16	24.1
1/17/2016	17	24.1
1/18/2016	18	24.1
1/19/2016	19	24.1
1/20/2016	20	24.1
1/21/2016	21	24.1
1/22/2016	22	24.1
1/23/2016	23	24.2

1/24/2016	24	24.2
1/25/2016	25	24.3
1/26/2016	26	24.3
1/27/2016	27	24.4
1/28/2016	28	24.5
1/29/2016	29	24.6
1/30/2016	30	24.7
1/31/2016	31	24.9
2/1/2016	32	25
2/2/2016	33	25.2
2/3/2016	34	25.4
2/4/2016	35	25.6
2/5/2016	36	25.8
2/6/2016	37	26
2/7/2016	38	26.3
2/8/2016	39	26.6
2/9/2016	40	26.8
2/10/2016	41	27.1
2/11/2016	42	27.4
2/12/2016	43	27.8
2/13/2016	44	28.1
2/14/2016	45	28.4
2/15/2016	46	28.8
2/16/2016	47	29.1
2/17/2016	48	29.5
2/18/2016	49	29.9
2/19/2016	50	30.3
2/20/2016	51	30.6
2/21/2016	52	31
2/22/2016	53	31.4
2/23/2016	54	31.8

2/24/2016	55	32.2
2/25/2016	56	32.6
2/26/2016	57	33
2/27/2016	58	33.4
2/28/2016	59	33.8
2/29/2016	60	34
3/1/2016	61	34.2
3/2/2016	62	34.6
3/3/2016	63	35
3/4/2016	64	35.4
3/5/2016	65	35.8
3/6/2016	66	36.1
3/7/2016	67	36.5
3/8/2016	68	36.9
3/9/2016	69	37.3
3/10/2016	70	37.6
3/11/2016	71	38
3/12/2016	72	38.3
3/13/2016	73	38.7
3/14/2016	74	39
3/15/2016	75	39.4
3/16/2016	76	39.7
3/17/2016	77	40
3/18/2016	78	40.4
3/19/2016	79	40.7
3/20/2016	80	41.1
3/21/2016	81	41.4
3/22/2016	82	41.7
3/23/2016	83	42.1
3/24/2016	84	42.4
3/25/2016	85	42.8

3/26/2016	86	43.1
3/27/2016	87	43.5
3/28/2016	88	43.8
3/29/2016	89	44.2
3/30/2016	90	44.5
3/31/2016	91	44.9
4/1/2016	92	45.3
4/2/2016	93	45.7
4/3/2016	94	46
4/4/2016	95	46.4
4/5/2016	96	46.8
4/6/2016	97	47.2
4/7/2016	98	47.6
4/8/2016	99	48
4/9/2016	100	48.4
4/10/2016	101	48.9
4/11/2016	102	49.3
4/12/2016	103	49.7
4/13/2016	104	50.1
4/14/2016	105	50.5
4/15/2016	106	51
4/16/2016	107	51.4
4/17/2016	108	51.8
4/18/2016	109	52.2
4/19/2016	110	52.6
4/20/2016	111	53.1
4/21/2016	112	53.5
4/22/2016	113	53.9
4/23/2016	114	54.3
4/24/2016	115	54.7
4/25/2016	116	55.1

4/26/2016	117	55.5
4/27/2016	118	55.8
4/28/2016	119	56.2
4/29/2016	120	56.6
4/30/2016	121	56.9
5/1/2016	122	57.3
5/2/2016	123	57.6
5/3/2016	124	58
5/4/2016	125	58.3
5/5/2016	126	58.6
5/6/2016	127	59
5/7/2016	128	59.3
5/8/2016	129	59.6
5/9/2016	130	59.9
5/10/2016	131	60.2
5/11/2016	132	60.5
5/12/2016	133	60.8
5/13/2016	134	61
5/14/2016	135	61.3
5/15/2016	136	61.6
5/16/2016	137	61.9
5/17/2016	138	62.2
5/18/2016	139	62.5
5/19/2016	140	62.7
5/20/2016	141	63
5/21/2016	142	63.3
5/22/2016	143	63.6
5/23/2016	144	63.9
5/24/2016	145	64.2
5/25/2016	146	64.5
5/26/2016	147	64.9

5/27/2016	148	65.2
5/28/2016	149	65.5
5/29/2016	150	65.8
5/30/2016	151	66.2
5/31/2016	152	66.5
6/1/2016	153	66.9
6/2/2016	154	67.3
6/3/2016	155	67.6
6/4/2016	156	68
6/5/2016	157	68.4
6/6/2016	158	68.8
6/7/2016	159	69.2
6/8/2016	160	69.6
6/9/2016	161	70
6/10/2016	162	70.4
6/11/2016	163	70.8
6/12/2016	164	71.2
6/13/2016	165	71.6
6/14/2016	166	72
6/15/2016	167	72.4
6/16/2016	168	72.8
6/17/2016	169	73.2
6/18/2016	170	73.6
6/19/2016	171	73.9
6/20/2016	172	74.3
6/21/2016	173	74.6
6/22/2016	174	75
6/23/2016	175	75.3
6/24/2016	176	75.6
6/25/2016	177	75.9
6/26/2016	178	76.2

6/27/2016	179	76.5
6/28/2016	180	76.7
6/29/2016	181	76.9
6/30/2016	182	77.2
7/1/2016	183	77.4
7/2/2016	184	77.5
7/3/2016	185	77.7
7/4/2016	186	77.8
7/5/2016	187	77.9
7/6/2016	188	78.1
7/7/2016	189	78.1
7/8/2016	190	78.2
7/9/2016	191	78.2
7/10/2016	192	78.3
7/11/2016	193	78.3
7/12/2016	194	78.3
7/13/2016	195	78.3
7/14/2016	196	78.3
7/15/2016	197	78.2
7/16/2016	198	78.2
7/17/2016	199	78.1
7/18/2016	200	78
7/19/2016	201	77.9
7/20/2016	202	77.9
7/21/2016	203	77.8
7/22/2016	204	77.7
7/23/2016	205	77.6
7/24/2016	206	77.5
7/25/2016	207	77.3
7/26/2016	208	77.2
7/27/2016	209	77.1

7/28/2016	210	77
7/29/2016	211	76.9
7/30/2016	212	76.8
7/31/2016	213	76.7
8/1/2016	214	76.6
8/2/2016	215	76.5
8/3/2016	216	76.4
8/4/2016	217	76.3
8/5/2016	218	76.2
8/6/2016	219	76.1
8/7/2016	220	76
8/8/2016	221	75.9
8/9/2016	222	75.8
8/10/2016	223	75.7
8/11/2016	224	75.6
8/12/2016	225	75.5
8/13/2016	226	75.4
8/14/2016	227	75.3
8/15/2016	228	75.2
8/16/2016	229	75
8/17/2016	230	74.9
8/18/2016	231	74.8
8/19/2016	232	74.7
8/20/2016	233	74.5
8/21/2016	234	74.4
8/22/2016	235	74.2
8/23/2016	236	74
8/24/2016	237	73.8
8/25/2016	238	73.6
8/26/2016	239	73.4
8/27/2016	240	73.2

8/28/2016	241	73
8/29/2016	242	72.7
8/30/2016	243	72.4
8/31/2016	244	72.2
9/1/2016	245	71.9
9/2/2016	246	71.5
9/3/2016	247	71.2
9/4/2016	248	70.9
9/5/2016	249	70.5
9/6/2016	250	70.1
9/7/2016	251	69.7
9/8/2016	252	69.3
9/9/2016	253	68.9
9/10/2016	254	68.5
9/11/2016	255	68.1
9/12/2016	256	67.6
9/13/2016	257	67.2
9/14/2016	258	66.7
9/15/2016	259	66.2
9/16/2016	260	65.8
9/17/2016	261	65.3
9/18/2016	262	64.8
9/19/2016	263	64.3
9/20/2016	264	63.9
9/21/2016	265	63.4
9/22/2016	266	62.9
9/23/2016	267	62.4
9/24/2016	268	62
9/25/2016	269	61.5
9/26/2016	270	61.1
9/27/2016	271	60.6

9/28/2016	272	60.2
9/29/2016	273	59.7
9/30/2016	274	59.3
10/1/2016	275	58.9
10/2/2016	276	58.5
10/3/2016	277	58.1
10/4/2016	278	57.7
10/5/2016	279	57.3
10/6/2016	280	56.9
10/7/2016	281	56.5
10/8/2016	282	56.2
10/9/2016	283	55.8
10/10/2016	284	55.5
10/11/2016	285	55.1
10/12/2016	286	54.8
10/13/2016	287	54.4
10/14/2016	288	54.1
10/15/2016	289	53.8
10/16/2016	290	53.4
10/17/2016	291	53.1
10/18/2016	292	52.8
10/19/2016	293	52.4
10/20/2016	294	52.1
10/21/2016	295	51.7
10/22/2016	296	51.4
10/23/2016	297	51
10/24/2016	298	50.7
10/25/2016	299	50.3
10/26/2016	300	49.9
10/27/2016	301	49.5
10/28/2016	302	49.1

10/29/2016	303	48.7
10/30/2016	304	48.2
10/31/2016	305	47.8
11/1/2016	306	47.3
11/2/2016	307	46.9
11/3/2016	308	46.4
11/4/2016	309	45.9
11/5/2016	310	45.4
11/6/2016	311	44.9
11/7/2016	312	44.3
11/8/2016	313	43.8
11/9/2016	314	43.3
11/10/2016	315	42.7
11/11/2016	316	42.1
11/12/2016	317	41.6
11/13/2016	318	41
11/14/2016	319	40.4
11/15/2016	320	39.8
11/16/2016	321	39.2
11/17/2016	322	38.6
11/18/2016	323	38.1
11/19/2016	324	37.5
11/20/2016	325	36.9
11/21/2016	326	36.3
11/22/2016	327	35.8
11/23/2016	328	35.2
11/24/2016	329	34.6
11/25/2016	330	34.1
11/26/2016	331	33.6
11/27/2016	332	33.1
11/28/2016	333	32.6

11/29/2016	334	32.1
11/30/2016	335	31.6
12/1/2016	336	31.2
12/2/2016	337	30.7
12/3/2016	338	30.3
12/4/2016	339	29.9
12/5/2016	340	29.5
12/6/2016	341	29.2
12/7/2016	342	28.8
12/8/2016	343	28.5
12/9/2016	344	28.2
12/10/2016	345	27.9
12/11/2016	346	27.6
12/12/2016	347	27.4
12/13/2016	348	27.2
12/14/2016	349	26.9
12/15/2016	350	26.7
12/16/2016	351	26.6
12/17/2016	352	26.4
12/18/2016	353	26.2
12/19/2016	354	26.1
12/20/2016	355	25.9
12/21/2016	356	25.8
12/22/2016	357	25.7
12/23/2016	358	25.6
12/24/2016	359	25.5
12/25/2016	360	25.4
12/26/2016	361	25.3
12/27/2016	362	25.2
12/28/2016	363	25.2
12/29/2016	364	25.1

12/30/2016	365	25
12/31/2016	366	25

- Comparison in pictures

  Overall year

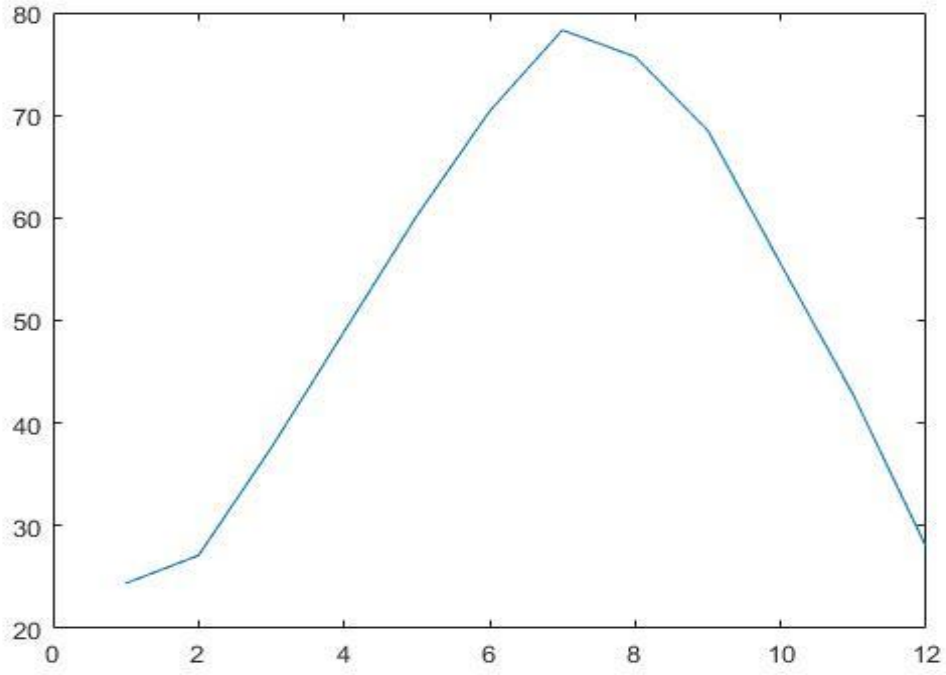
  This is also the way I read the data and call the function.

```
>> a = xlsread('weatherOfLincolnDay2016.xlsx','B:B');
>> b = xlsread('weatherOfLincolnDay2016.xlsx','C:C');
>> p3 = lagrangeinterpolating(a,b,10)

p3 =

   24.4000

>> p3 = newtonsDiv(a,b,10)

p3 =

   24.4000

fx >>
```

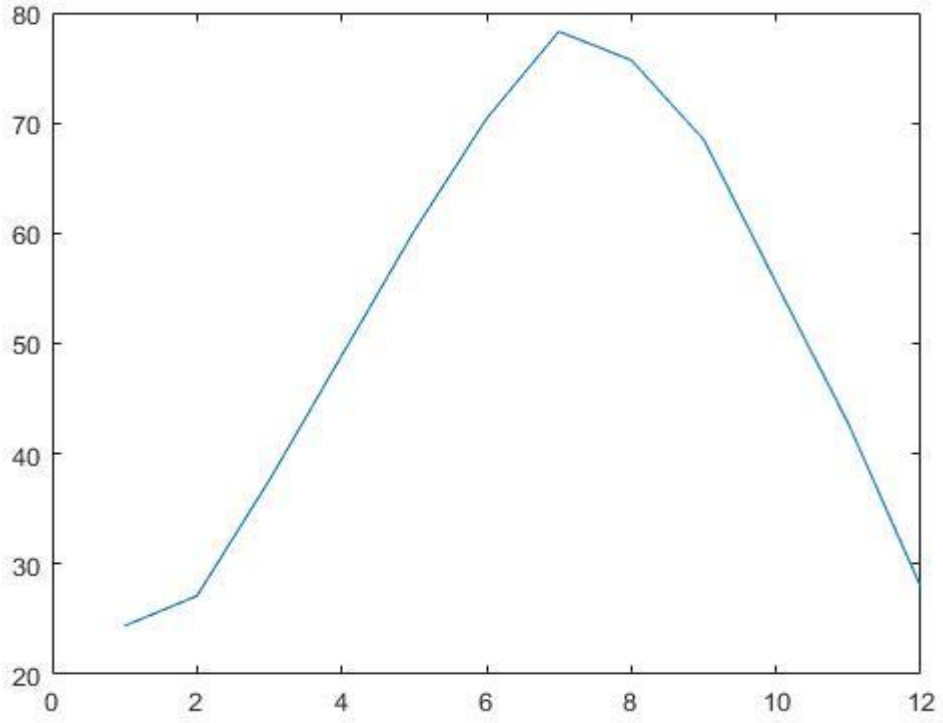
  It has given the same number with T = 10;

```
>> p3 = lagrangeinterpolating(a,b,1)

p3 =

   24.9000

>> p3 = newtonsDiv(a,b,1)

p3 =

   24.4000

>> p3 = lagrangeinterpolating(a,b,20)

p3 =

   24.1000

>> p3 = newtonsDiv(a,b,20)

p3 =

   24.4000

>> p3 = lagrangeinterpolating(a,b,100)

p3 =

   48.4000

>> p3 = newtonsDiv(a,b,100)

p3 =

   24.4000

fx >>
```

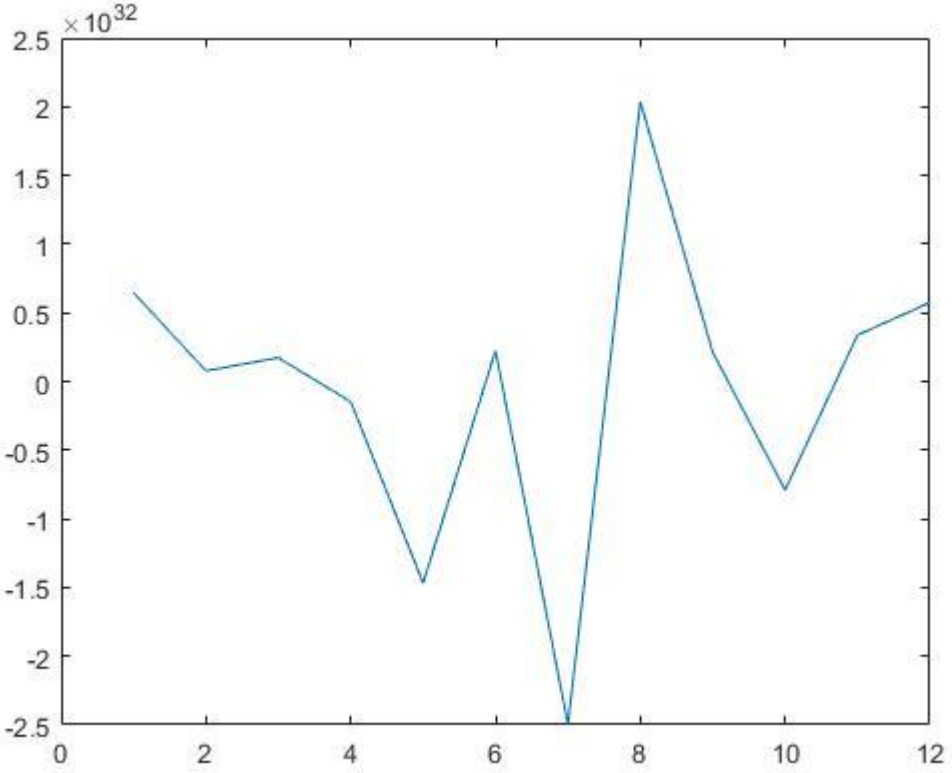
The differences start when T = 1, 20, 100. No big change with Newton' s Interpolation method. Lagrange Interpolation method has changed a lot every time. I have tried it on our homework data, which gave the same issue. In this case, Newton' s Interpolation method would support more accurate and stable data compare to Lagrange Interpolation method.



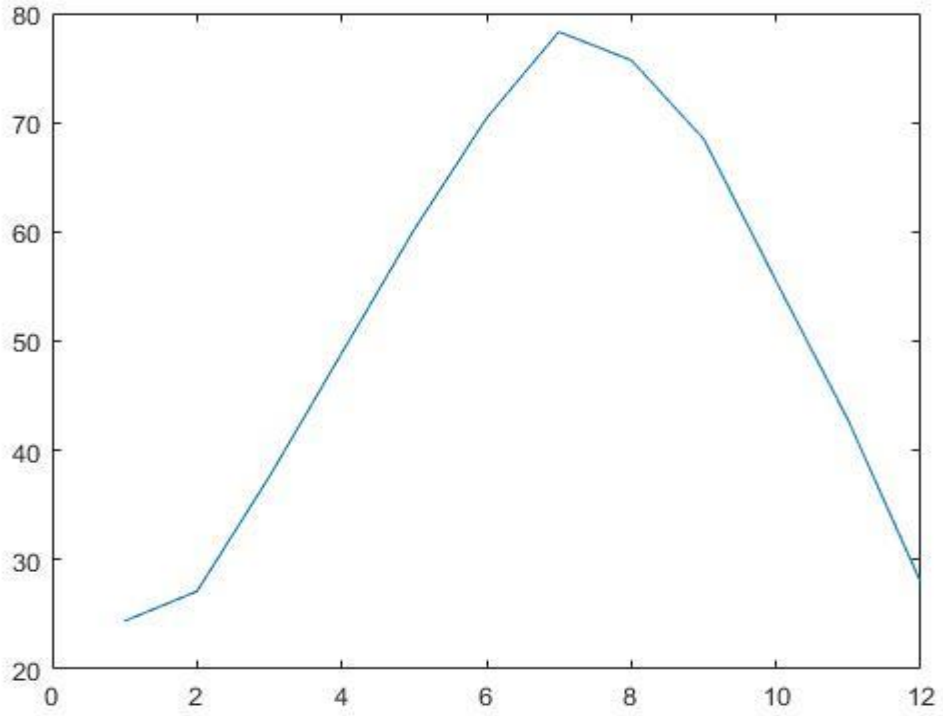
Month Interpolation graph of Lagrange Interpolation method. (T = 10)



Month Interpolation graph of Newton’ s Interpolation method. (T = 10)



Month Interpolation graph of Lagrange Interpolation method. (T = 100)



Month Interpolation graph of Newton' s Interpolation method. (T = 100)

It shows that Lagrange Interpolation method is not accurate compare to Newton' s Interpolation method with the increasing/changing of T' s value.

According to the calculations have given from the class note, Newton' s Interpolation method has more advantage in computational complexity.

No big difference with the data I have given on speed.

- Conclusion

  Overall, the pictures I have shown supported that Newton' s Interpolation method tends to have more accurate and constant results for relative large database analysis compare to Lagrange Interpolation method. According to some information I have researched online and our class notes. I would highly recommend to use the Newton' s interpolation method.