

**STATE OF OHIO
DEPARTMENT OF TRANSPORTATION**

**SUPPLEMENT 1040
DETERMINATION OF STATISTICAL OUTLIERS**

April 19, 2002

1040.01 Scope. This supplement outlines the procedures for calculating statistical outliers in a sample set.

1040.02 Definition. An outlier is a sample that appears to deviate markedly from the other members of the sample set in which it occurs.

1040.03 Calculation Procedure.

1. Calculate the average ($\bar{x}$) and standard deviation (σ) of all the samples in the sample set.
2. Find the value of T from the attached table using the total number of samples (n) in the sample set.
3. Determine D (the total allowable deviation either side of $\bar{x}$) by multiplying T by σ .
4. Establish values for MAX and MIN by adding and subtracting D to and from $\bar{x}$.
5. Any sample greater than MAX or less than MIN is an outlier.

1040.04 Example.

Sample Set		Calculation	
1A	41	n = 10	T (from table) = 2.290
1B	37	$\bar{x}$ = 34.3	
1C	41	σ = 5.8	MAX = $\bar{x}$ + D
1D	37		= 34.3 + 13.3
2A	21	D = T σ	= 47.6
2B	30	= 2.290 x 5.8	MIN = $\bar{x}$ - D
2C	34	= 13.3	= 34.3 - 13.3
2D	33		= 21.0
3A	34		
3B	35		

Since Sample 2A(21) is equal to MIN (21.0) and Samples 1A and 1C (both 41) are less than MAX (47.6), there are no outliers in this sample set. If MIN had been calculated as 21.1, then Sample 2A would have been an outlier.

n	T	n	T	n	T
		51	3.136	101	3.386
		52	3.143	102	3.390
3	1.155	53	3.151	103	3.393
4	1.481	54	3.158	104	3.397
5	1.715	55	3.166	105	3.400
6	1.887	56	3.172	106	3.403
7	2.020	57	3.180	107	3.406
8	2.126	58	3.186	108	3.409
9	2.215	59	3.193	109	3.412
10	2.290	60	3.199	110	3.415
11	2.355	61	3.205	111	3.418
12	2.412	62	3.212	112	3.422
13	2.462	63	3.218	113	3.424
14	2.507	64	3.224	114	3.427
15	2.549	65	3.230	115	3.430
16	2.585	66	3.235	116	3.433
17	2.620	67	3.241	117	3.435
18	2.651	68	3.246	118	3.438
19	2.681	69	3.252	119	3.441
20	2.709	70	3.257	120	3.444
21	2.733	71	3.262	121	3.447
22	2.758	72	3.267	122	3.450
23	2.781	73	3.272	123	3.452
24	2.802	74	3.278	124	3.455
25	2.822	75	3.282	125	3.457
26	2.841	76	3.287	126	3.460
27	2.859	77	3.291	127	3.462
28	2.876	78	3.297	128	3.465
29	2.893	79	3.301	129	3.467
30	2.908	80	3.305	130	3.470
31	2.924	81	3.309	131	3.473
32	2.938	82	3.315	132	3.475
33	2.952	83	3.319	133	3.478
34	2.965	84	3.323	134	3.480
35	2.979	85	3.327	135	3.482
36	2.991	86	3.331	136	3.484
37	3.003	87	3.335	137	3.487
38	3.014	88	3.339	138	3.489
39	3.025	89	3.343	139	3.491
40	3.036	90	3.347	140	3.493
41	3.046	91	3.350	141	3.497
42	3.057	92	3.355	142	3.499
43	3.067	93	3.358	143	3.501
44	3.075	94	3.362	144	3.503
45	3.085	95	3.365	145	3.505
46	3.094	96	3.369	146	3.507
47	3.103	97	3.372	147	3.509
48	3.111	98	3.377		
49	3.120	99	3.380		
50	3.128	100	3.383		