

## Statistic vs. parameter

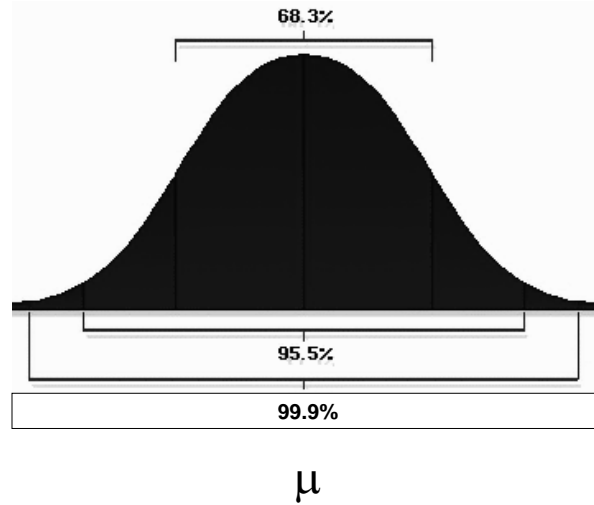
	<u>Sample Statistic</u>	<u>Population Parameter</u>
Mean	$\bar{X}$	$\mu$ (mu)
Standard deviation	s	$\sigma$ (sigma)

## Standard error

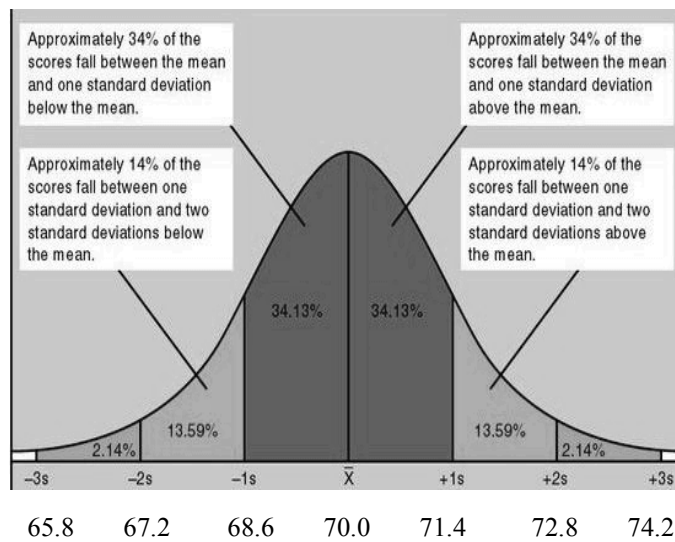
$$s.e. = \sqrt{\frac{p \times q}{n}}$$

p = proportion saying yes  
q = proportion saying no (1-p)  
n = sample size

# Standard error



# Standard error



Properties of standard errors:  
different values of p's and q's

<u>p</u>	<u>q</u>	<u>n</u>	<u>s.e.</u>
0.0	1.0	100	0.0
.20	.80	100	.04
.40	.60	100	.049
.50	.50	100	.05
.60	.40	100	.049
.80	.20	100	.04
1.0	0.0	100	0.0

Properties of standard errors:  
different sample sizes

<u>n</u>	<u>p</u>	<u>q</u>	<u>s.e.</u>
50	.5	.5	.07
100	.5	.5	.05
150	.5	.5	.04
200	.5	.5	.035
250	.5	.5	.032
1000	.5	.5	.016

## Examples: Roper Public Opinion Survey

	p	q	n	s.e.
AP (10/4-6/04)	.46	.54	1541	1.3%
ABC (10/8/01)	.92	.08	1009	.85%
Gallup (8/16/01)	.57	.43	1013	1.6%

## Table of Random Numbers

353	531	892	109	782	283	383	699	927	271	572	665	272	033	256	822	646	599
326	551	815	937	908	698	509	303	911	025	788	311	792	837	739	552	234	572
487	127	026	313	341	479	722	602	236	382	151	011	778	951	709	060	258	536
754	989	948	804	025	997	562	674	876	870	799	032	043	526	100	957	539	320
227	147	613	857	859	941	274	415	620	697	002	340	959	915	626	297	533	572
806	751	870	677	373	854	094	958	012	395	381	862	250	614	683	747	628	551
513	402	866	696	142	063	252	818	477	081	526	028	338	702	819	679	829	909
806	644	284	010	686	076	915	751	214	470	879	935	141	398	387	734	589	212
207	958	295	175	396	117	918	037	319	432	641	020	612	068	547	948	278	020
620	690	036	654	078	918	721	454	671	995	596	286	377	567	237	520	244	694
466	427	395	393	520	074	634	578	023	246	718	851	870	216	107	387	621	509
058	787	706	094	603	303	300	185	705	825	727	849	501	551	001	123	873	926
503	584	221	176	116	309	975	910	535	258	450	962	183	666	156	454	239	551
705	579	790	244	547	495	973	805	251	235	783	701	378	460	398	223	688	574
026	919	327	267	616	572	620	245	257	525	008	997	885	063	340	0666	328	412
779	134	709	373	332	507	525	640	840	825	739	457	999	789	068	829	336	148
461	149	798	070	930	862	672	718	849	440	769	864	029	494	829	339	910	303
885	219	668	005	418	832	416	220	692	820	641	375	542	093	364	145	848	792
874	034	514	628	693	628	200	006	795	114	842	554	881	377	427	216	193	042
790	386	783	689	565	565	349	410	216	558	301	096	577	520	923	717	188	545
028	549	529	434	083	800	569	290	298	345	937	569	279	951	183	787	808	149
212	355	367	297	638	282	720	178	695	430	074	427	422	082	629	971	456	649
960	399	700	253	375	594	024	223	383	050	345	389	739	911	022	189	565	982
648	561	528	870	907	713	608	682	576	272	718	849	715	156	823	174	703	600
416	957	547	553	534	707	206	963	459	894	847	611	763	755	388	114	274	681
416	603	967	591	013	878	424	452	659	676	984	806	692	012	934	436	869	557
719	637	969	450	489	328	364	459	708	305	074	378	670	284	431	361	912	251
595	969	382	627	920	772	560	892	500	138	461	213	905	775	881	782	272	032
769	536	611	069	694	254	195	799	928	452	200	674	202	812	986	143	143	264
355	587	878	446	137	690	647	407	362	882	033	746	390	609	144	531	944	869
543	594	002	496	648	999	262	702	811	087	336	020	166	472	293	904	949	465
727	070	996	660	024	135	799	414	136	666	841	134	588	915	116	802	917	993
160	707	361	339	054	251	397	480	805	790	228	702	690	170	511	937	723	505
147	360	150	990	380	789	436	781	337	250	860	294	684	572	415	250	726	647
151	064	609	878	095	737	897	510	891	450	992	950	890	434	306	781	006	681

Source: [http://www.irs.ustreas.gov/prod/bus\\_info/tax\\_pro/irm-part/part03/34740020.GIF](http://www.irs.ustreas.gov/prod/bus_info/tax_pro/irm-part/part03/34740020.GIF)

## Periodicity

<u>Platoon 1</u>	<u>Platoon 2</u>	<u>Platoon 3</u>	<u>Platoon 4</u>
Sgt.	Sgt.	Sgt.	Sgt.
Corporal	Corporal	Corporal	Corporal
Corporal	Corporal	Corporal	Corporal
Private	Private	Private	Private
Private	Private	Private	Private
Private	Private	Private	Private
Private	Private	Private	Private
Private	Private	Private	Private
Private	Private	Private	Private
Private	Private	Private	Private

## Example: stratified sample

	<u>population %</u>	<u>sample n</u>
Anglo	70%	70
Black	20%	20
Hispanics	10%	10
Total	100%	100