**PPIC General Methodology Details**

http://www.ppic.org/content/uploads/SurveyMethodology.pdf

**Publications link for PPIC—Individual Survey reports**

http://www.ppic.org/content/pubs/survey/S_515MBS.pdf

The California Proposition 64 results legalizing Marijuana are known:

# California Proposition 64 — Legalize Marijuana — Results: Approved

BY THE NEW YORK TIMES AUG. 1, 2017, 11:24 AM ET

| ANSWER | VOTES | PCT. |
|---|---|---|
| Yes | 7,979,041 | **57.1%** |
| No | 5,987,020 | **42.9** |

100% reporting (24,849 of 24,849 precincts)

https://www.nytimes.com/elections/results/california-ballot-measure-64-legalize-marijuana

Raw frequency on PPIC intended vote question Q21 in Oct 2016

| | | |
|---|---|---|
| Yes: 52.3% | underestimate by | 4.8% |
| No: 42.2% | overestimate by | 0.1% |
| DK: 5.4% | | |
| Total Error | | 4.9% |

## Election polls as predictors of Results (Presented as Democratic Advantage)

| YEAR | NATIONAL POLLING AVERAGE | ELECTION RESULT | ABSOLUTE ERROR |
|---|---|---|---|
| 1968 | -1.2 | -0.7 | 0.5 |
| 1972 | -25.0 | -23.2 | 1.9 |
| 1976 | +1.3 | +2.1 | 0.8 |
| 1980 | -2.5 | -9.7 | 7.2 |
| 1984 | -17.2 | -18.2 | 1.0 |
| 1988 | -9.1 | -7.7 | 1.4 |
| 1992 | +5.7 | +5.6 | 0.1 |
| 1996 | +11.8 | +8.5 | 3.3 |
| 2000 | -2.9 | +0.5 | 3.4 |
| 2004 | -1.6 | -2.5 | 0.9 |
| 2008 | +7.6 | +7.3 | 0.3 |
| 2012 | +1.2 | +3.9 | 2.7 |
| **Average** | | | **2.0** |
| **2016** | **+3.3** | **+2.1** | **1.2** |

Sources:

Harry Enten, "Trump Is Just A Normal Polling Error Behind Clinton" HTTPS://FIVETHIRTYEIGHT.COM/FEATURES/TRUMP-IS-JUST-A-NORMAL-POLLING-ERROR-BEHIND-CLINTON/NOV 4, 2016 AT 11:09 AM

2016 Poll Average http://www.usatoday.com/pages/interactives/2016/election/poll-tracker

20i6 Election Result: /http://www.cnn.com/election/results/president

In PPIC

Weight by weight.

In ANES

Weight by V160102

See page 6.

**Calculating Data Weights for 2012 Politics and Protest Survey**

Toronto CMA

| Age Categories | No. of males | No. of females | Male, % | Female, % |
|---|---|---|---|---|
| 18-24 | 286520 | 261235 | 6.5007 | 5.9326 |
| 25-34 | 369355 | 405995 | 8.3879 | 9.2200 |
| 35-44 | 400730 | 439450 | 9.1005 | 9.9798 |
| 45-54 | 433695 | 453965 | 9.8491 | 10.3094 |
| 55-64 | 309900 | 335895 | 7.0376 | 7.6280 |
| 65+ | 310830 | 395825 | 7.0589 | 8.9891 |
| Total 4403395 | 2111030 | 2292365 | 47.9409 | 52.0590 |

**Source :** Statistics Canada. 2012. *Toronto, Ontario (Code 535) and Ontario (Code 35)* (table). *Census Profile*. 2011 Census. Statistics Canada Catalogue no. 98-316-XWE. Ottawa. Released May 29, 2012. http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/index.cfm?Lang=E (accessed May 29, 2012).

**Calculating data weights**:

6 age cohorts by gender (using 2011 Census Data)

| **Percentages in census data** | Gender | |
|---|---|---|
| Age | Males | Females |
| 18-24 | 6.5007 | 5.9326 |
| 25-34 | 8.3879 | 9.2200 |
| 35-44 | 9.1005 | 9.9798 |
| 45-54 | 9.8491 | 10.3094 |
| 55-64 | 7.0376 | 7.6280 |
| 65+ | 7.0589 | 8.9891 |
| Totals | 47.9409 | 52.0590 |

| **Percentages in study data** | Gender | |
|---|---|---|
| Age | Males | Females |
| 18-24 | 7.8693 | 3.2022 |
| 25-34 | 16.7429 | 8.4172 |
| 35-44 | 11.7019 | 5.7640 |
| 45-54 | 13.6322 | 4.3001 |
| 55-64 | 11.6194 | 4.6661 |
| 65+ | 9.7896 | 2.2873 |
| Totals | 71.3632 | 28.6368 |

| **Calculated Age & Gender Weights** | Gender | |
|---|---|---|
| Age | Males | Females |
| 18-24 | .8261 | 1.8527 |
| 25-34 | .5009 | 1.0954 |
| 35-44 | .7777 | 1.7314 |
| 45-54 | .7225 | 2.3975 |
| 55-64 | .6057 | 1.6348 |
| 65+ | .7211 | 3.9300 |
| Gender Weight | .6718 | 1.8179 |

**Accuracy in Reporting No Statistically Significant Difference**

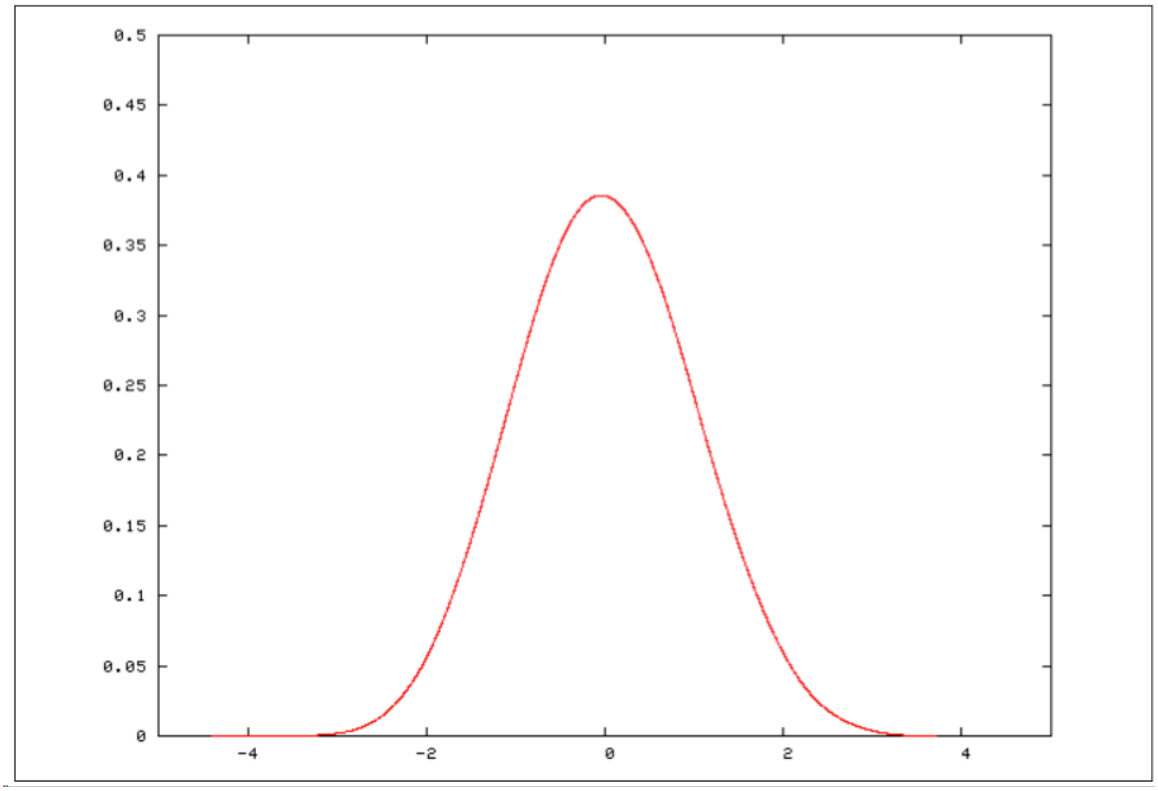
| | Pollsters' reports | Media reports |
|---|---|---|
| accurate | 66.7% | 55.9% |
| inaccurate | 33.3% | 44.1% |
| N= | 33 | 102 |

Source: Francois Petry and Frederick Bastien entitled "Follow the Pollsters…"*CJPS* March 2013

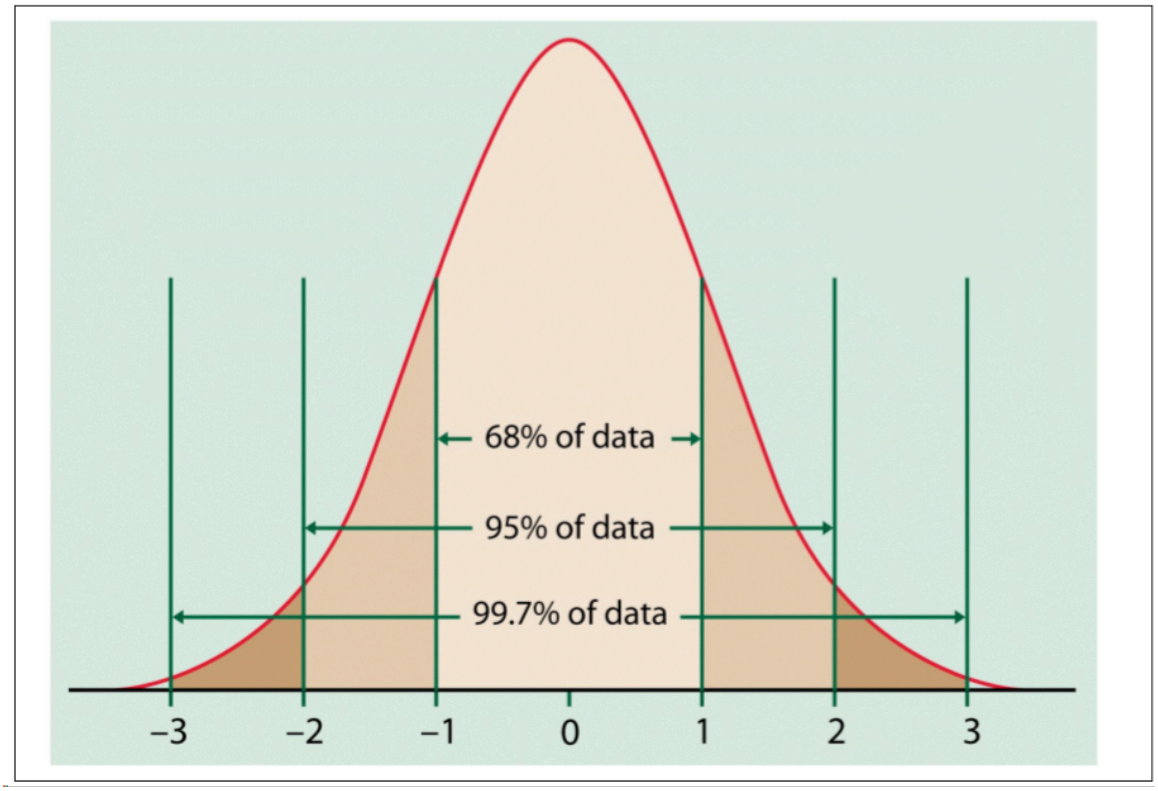
Margin of error

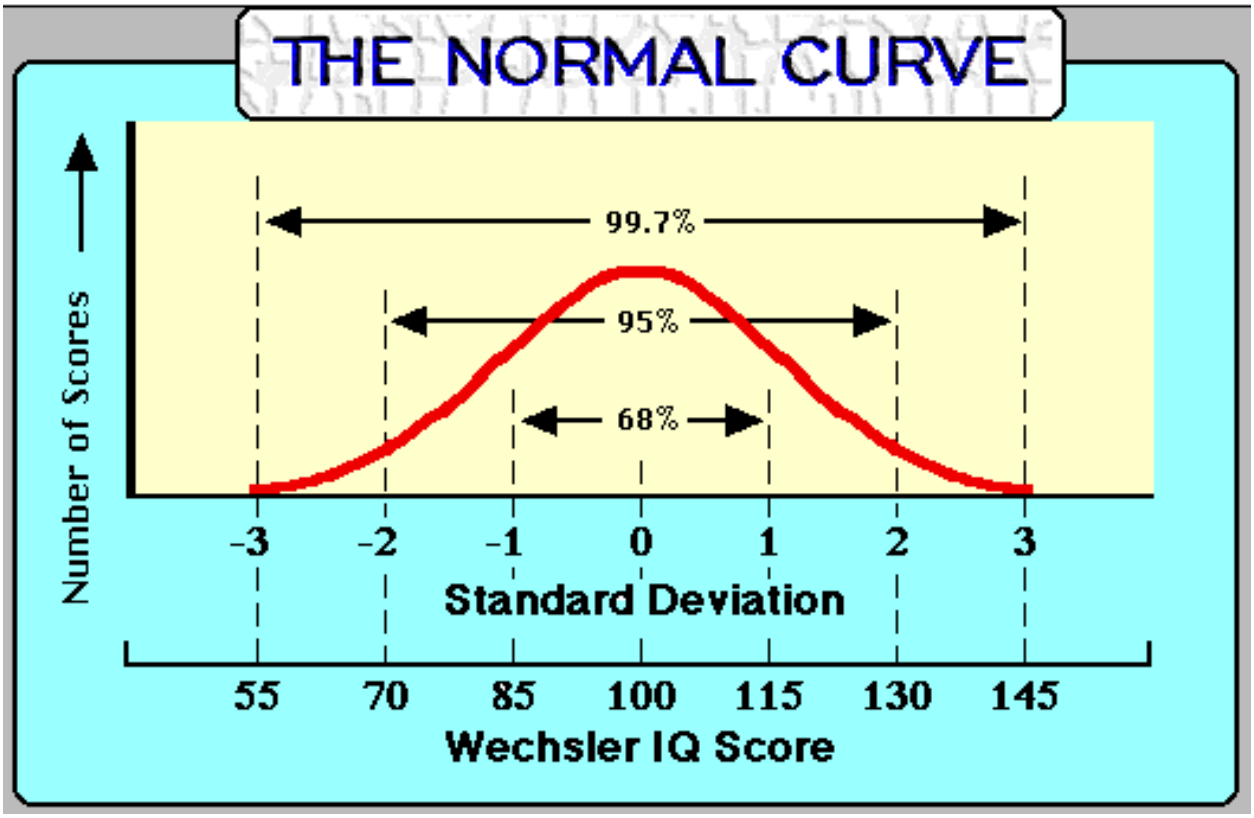
$$= 1.96\sqrt{\frac{p(1-p)}{n}}$$

K&W Fig 7.1



K&W Fig 7.2




THE NORMAL CURVE
Number of Scores
99.7%
95%
68%
-3
-2
-1
0
1
2
3
Standard Deviation
55
70
85
100
115
130
145
Wechsler IQ Score

Margin of Error Calculation
Oct 2016 PPIC survey

$$= 1.96\sqrt{\frac{p(1-p)}{n}}$$

$$= 1.96\sqrt{\frac{.25}{1704}}$$

$$= 1.96\left(\frac{.5}{41.3}\right)$$

$$= 1.96\,(.012)$$

$$= .024$$

$$= 2.4\%$$

Margin of Error Calculation
(taking missing values on q21 into account)

$$= 1.96\sqrt{\frac{.25}{1361}}$$

$$= 1.96\left(\frac{.5}{36.9}\right)$$

$$= 1.96\,(.014)$$

$$= .028$$

$$= 2.8\%$$

**MARGIN OF ERROR**

Sample Size

| **N=** / **Prop** | **100** | **200** | **300** | **400** | **500** | **700** | **1000** | **1500** | **2000** | **2500** | **3000** | **3500** | **4000** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± | ± |
| 10% or 90% | 5.9% | 4.2% | 3.4% | 2.9% | 2.6% | 2.2% | 1.9% | 1.5% | 1.3% | 1.2% | 1.1% | 1.0% | 0.9% |
| 20% or 80% | 7.8% | 5.6% | 4.6% | 3.9% | 3.5% | 3.0% | 2.5% | 2.0% | 1.8% | 1.6% | 1.4% | 1.3% | 1.2% |
| 30% or 70% | 9.0% | 6.4% | 5.2% | 4.5% | 4.0% | 3.4% | 2.8% | 2.3% | 2.0% | 1.8% | 1.6% | 1.5% | 1.4% |
| 40% or 60% | 9.6% | 6.8% | 5.6% | 4.8% | 4.3% | 3.6% | 3.0% | 2.5% | 2.2% | 2.0% | 1.8% | 1.6% | 1.5% |
| 50% | 9.8% | 6.9% | 5.7% | 4.9% | 4.4% | 3.7% | 3.1% | 2.5% | 2.2% | 2.0% | 1.8% | 1.7% | 1.6% |

ANES 2016 Response Rate

"On the pre-election interview, was 50 percent for the face-to-face component and 44 percent for the Internet component.

The reinterview rate on the post-election survey was 90 percent for the face-to-face component *(.5 x .9 = .45)* and 84 percent for the Internet component *(.44 X .84 = .37)."*

*Italicized calculations added.*

Raw frequency on PPIC intended vote question Q21 in Oct 2016

| | | |
|---|---|---|
| Yes: 52.3% | underestimate by | 4.8% |
| No: 42.2% | overestimate by | 0.1% |
| DK: 5.4% | | |
| Total Error | | 4.9% |

Weighted Frequencies on PPIC Oct 2016 Q21

| | | |
|---|---|---|
| Yes: 55.4% | underestimate by | 1.7% |
| No: 39.7% | underestimate by | 3.2% |
| DK: 4.8% | | |
| Total Error | | 4.9% |

Selected for Likely Voters

| | | |
|---|---|---|
| Yes: 55.4% | underestimate | 1.7% |
| No: 38.4% | underestimate | 4.5% |
| DK: 6.3% | | |
| Total Error | | 6.2% |

PPIC Report shows:

| | | |
|---|---|---|
| Yes: 55% | underestimate | 2.1% |
| No: 38% | underestimate | 4.9% |
| DK 6% | | |
| Total Error | | 7.0% |

**Types of Error**

| | There is: No ←→ | There is: A ←→ |
|---|---|---|
| I think there is: A ←→ | Type I error | Correct |
| I think there is: No ←→ | Correct | Type II error |

**How do we figure out the chances of sampling error?**

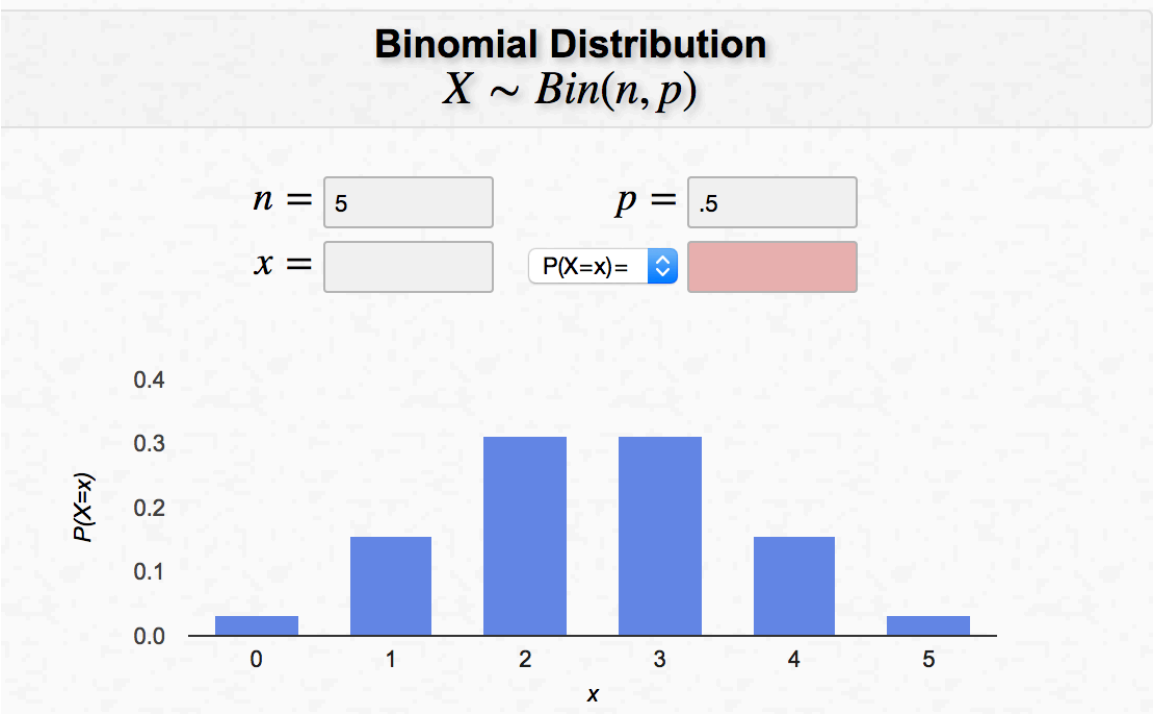
**We compare the percentage differences or measures of association we get in one sample with a theoretical model called a sampling distribution. It represents all the possible values one might get in taking a large number of samples.**

## Central Limit Theorem

**Even when a variable does not have a normal distribution, for random samples of any appreciable size, the sampling or probability distribution for that variable is approximately normal.**

# Graphic Probability Calculator

homepage.divms.uiowa.edu/~mbognar/applets/bin.html



# Numeric Probability Calculator

http://graphpad.com/quickcalcs/probability1.cfm

QuickCalcs

1. Select category | 2. Choose calculator | **3. Enter data** | 4. View resu

## Binomial, Poisson and Gaussian distributions

### Binomial distribution

The binomial distribution applies when there are two possible outcomes. You know the probability of obtaining either outcome (traditionally called "success" and "failure") and want to know the chance of obtaining a certain number of successes in a certain number of trials.

How many trials (or subjects) per experiment? [ ]

What is the probability of "success" in each trial or subject? [ ]

Calculate Probabilities

```
*Support for Recreational Marijuana by Ideology*.
data list free / MJ3 liberal3 count.
begin data.
1 1 192
1 2 90
1 3 69
2 1 69
2 2 93
2 3 116
3 1 74
3 2 105
3 3 173
end data.
value labels MJ3 1 'low' 2 'med' 3 'hi'.
variable labels influence 'undue influence' group 'group'.
value labels liberal3 1 'liberal' 2 'middle' 3 'conserv'.

weight by count.
crosstabs tables = MJ3 by liberal3
 /cells = column count
 /statistics = all.
```