

Confidence Levels

1. Pecan Problem

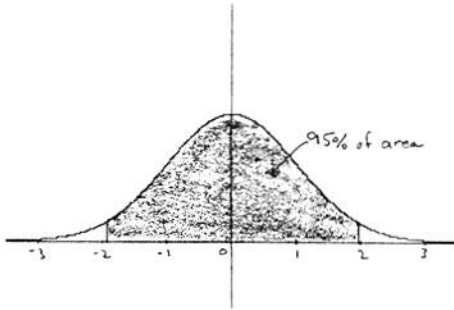
(a) $\sigma_{\bar{x}} = 2.4/\sqrt{50}$
 $= 0.339\dots$

(b) 90% confidence: $P(z) = 0.95$
 $z = 1.65$
 $\text{dev} = (1.65)(0.339\dots) \approx 0.56$
 \therefore range is $11.3 - 0.56$ to $11.3 + 0.56$
10.7 to 11.9 g

(c) 95% confidence: $P(z) = 0.975$
 $z = 1.96$
 $\text{dev} = (1.96)(0.339\dots) \approx 0.66$
 \therefore range is $11.3 - 0.66$ to $11.3 + 0.66$
10.6 to 12.0 g

(d) Range is between $300,000/12.0$ and $300,000/10.6$
25,000 to 28,300 pecans

(e)



2. I.Q. Test Problem

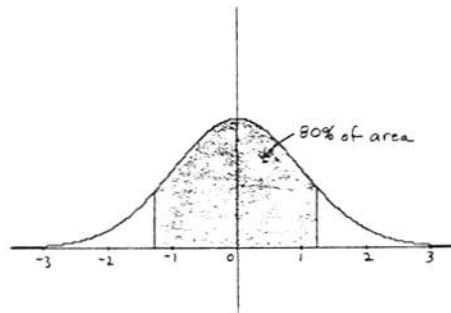
(a) $\sigma_{\bar{x}} = 11.7/\sqrt{30} = 2.136\dots$

(b) 80% confidence: $P(z) = 0.90$
 $z = 1.28$
 $\text{dev} = (1.28)(2.136\dots) \approx 2.7$
 range is $113 - 2.7$ to $113 + 2.7$
110 to 116

(c) 99% confidence: $P(z) = 0.995$
 $z = 2.576$
 $\text{dev} = (2.576)(2.136\dots) \approx 5.502$
 range is $113 - 5.5\dots$ to $113 + 5.5\dots$
107 to 119

(d) $\text{dev} = 100 - 113 = -13$
 $z = -13/11.7 = -1.11$
 $P(-1.11) = 1 - P(1.11) = 1 - 0.8665 = 0.1335$
 \therefore No. = $(0.1335)(3428) \approx$ 458 children

(e)



3. Chemical Analysis Problem

(a) x	$x - \bar{x}$	$(x - \bar{x})^2$
90.05	0.01	0.0001
90.09	0.05	0.0025
89.96	-0.08	0.0064
90.06	0.02	0.0004
360.16		0.0094

$\bar{x} = 360.16/4 = 90.04$

$\sigma_s = \sqrt{0.0094/3} = 0.056$

$\sigma_{\bar{x}} = 0.056/\sqrt{4} = 0.028$

(b) 95% confidence: $P(z) = 0.975$
 $z = 1.96$
 $\text{dev} = (1.96)(0.028) = 0.0548\dots$
 range = $90.04 - 0.05$ to $90.04 + 0.05$
89.99 to 90.09 g

5. Rock Star Popularity Problem

(a)

x	freq	$x \cdot \text{freq}$	dev	dev ²	$f \cdot \text{dev}^2$
1	1	1	-5.41	29.2681	29.2681
2	2	4	-4.41	19.4481	38.8962
3	6	18	-3.41	11.6281	69.7686
4	4	16	-2.41	5.8081	23.2324
5	12	60	-1.41	1.9881	23.8572
6	19	114	-.41	.1681	3.1939
7	33	231	.59	.3481	11.4873
8	13	104	1.59	2.5281	32.8653
9	7	63	2.59	6.7081	46.9567
10	3	30	3.59	12.8881	38.6643
	100	641			318.1900

Mean = $641/100 = 6.41$

$\sigma_s = \sqrt{318.19/99} = 1.79$

$\sigma_{\bar{x}} = 1.79/\sqrt{100} = 0.179$

(b) 85% confidence: $P(z) = 0.925$
 $z = 1.44$

$\text{dev} = (1.44)(0.179) = 0.26$

Range: $6.41 - 0.26$ to $6.41 + 0.26$
6.15 to 6.67

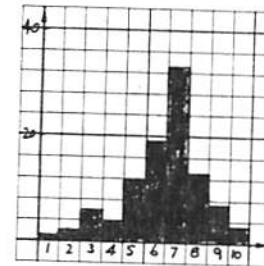
(c) $\text{dev} = 1 - 6.41 = -5.41$

$z = -5.41/1.79 = -3.022 \approx -3.0$

$P(-3.0) = 1 - P(3.0) = 1 - 0.99865 = 0.00135$

\therefore probability = 0.135%

(d)



(e) median = 7
 mode = 7