#4

a) The standard deviation, $\sigma = 6$, measures the standard distance bet x and μ (sampling error)

$n = 1$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{6}{\sqrt{1}} = 6$

b) $n = 9$ Sampling error of 2 points $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{6}{\sqrt{9}} = \frac{6}{3} = 2$

c) $n = 36$ Sampling error of 1 point : $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{6}{\sqrt{36}} = \frac{6}{6} = 1$

#5

$\sigma = 10$ $\mu = 60$

a) sample of $n = 4$ $\bar{x} = 55$

$z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}}$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{4}} = \frac{10}{2} = 5$

$z = \frac{55 - 60}{5} = \frac{-5}{5} = -1.0$

b) sample $n = 25$ $\bar{x} = 64$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{25}} = \frac{10}{5} = 2.$

$z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}} = \frac{64 - 60}{2} = \frac{4}{2} = +2.0$

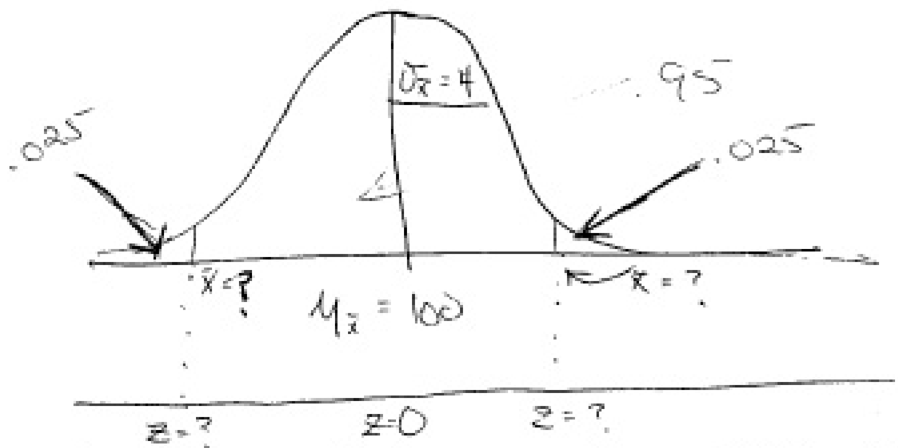
#5 c) sample $n = 100$ $\bar{x} = 62$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{100}} = \frac{10}{10} = 1$$

$$z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}} = \frac{62 - 60}{1} = \frac{2}{1} = +2.0$$

#7. normal pop $\mu = 100$ $\sigma = 20$

a) $n = 25$ samples $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{20}{\sqrt{25}} = \frac{20}{5} = 4$



b) Find ~~z~~ boundaries that separate middle 95% from outer 5% (both tails)

Area in tail .025 $\therefore$ $z = +1.96$
$z = -1.96$

actual sample means

$$\bar{x} = \mu + z\sigma_{\bar{x}}$$
$$= 100 + (1.96)(4) = 107.84$$

$$\bar{x} = 100 + (-1.96)(4) = 92.16$$

c) sample mean $\bar{x} = 106$ for sample $n = 25$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{20}{\sqrt{25}} = \frac{20}{5} = 4$$

$$z = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}} = \frac{106 - 100}{4} = \frac{6}{4} = +1.5$$

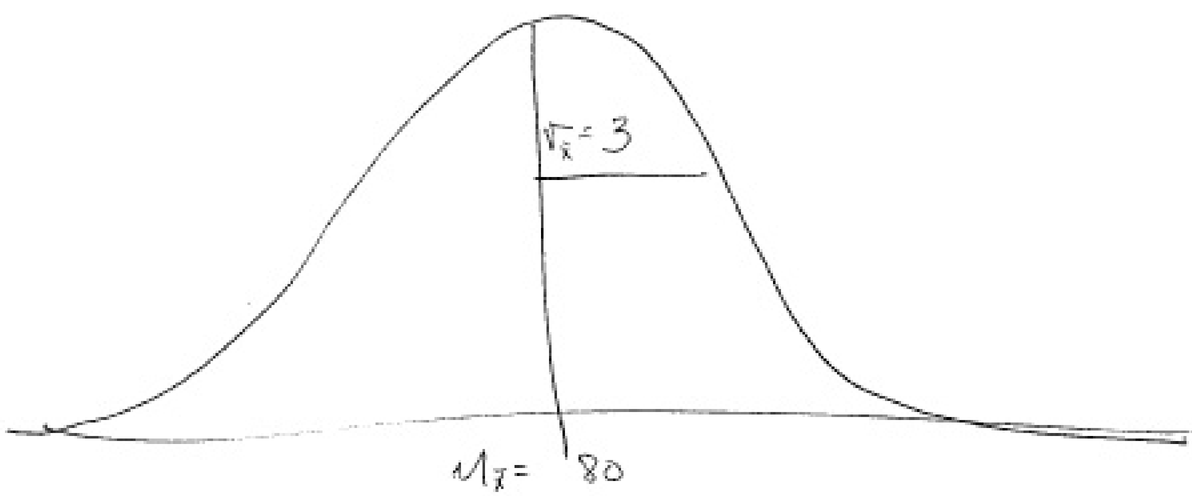
In order to be in extreme 5% (2½% above, 2½% below) the z must be ±1.96 or greater.

∴ no, this mean is <u>not</u> in the extreme 5%

#12 Personality test scores norm. dist. $\mu = 80$ $\sigma = 12$

Random sample of $n = 16$ selected:

a) Sampling Distrib. $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{12}{\sqrt{16}} = \frac{12}{4} = 3$



b) What prop. of sample means > 85

$$z = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}} = \frac{85 - 80}{3} = \frac{5}{3} = +1.66$$

$p(\bar{x} > 85) = .0485$

$\therefore$ 4.85% > 85 (tail)

c) prop < 83

$$z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}} = \frac{83 - 80}{3} = \frac{3}{3} \quad +1.0$$

prop < 83 = .8413 or 84.13% of the sample means
(area below z of +1.0)

d) prop < 74

$$z = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}}$$

$$z = \frac{74 - 80}{3} = \frac{-6}{3} = -2.00$$

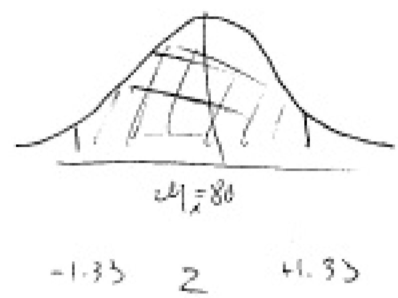
prop < 74 = .0228 or 2.28%

e) p (Sample mean within 4 points of μ) i.e sample mean between 76 and 84

$z = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}}$

$z = \frac{76-80}{3} = \frac{-4}{3} = -1.33$

$z = \frac{84-80}{3} = +\frac{4}{3} = +1.33$



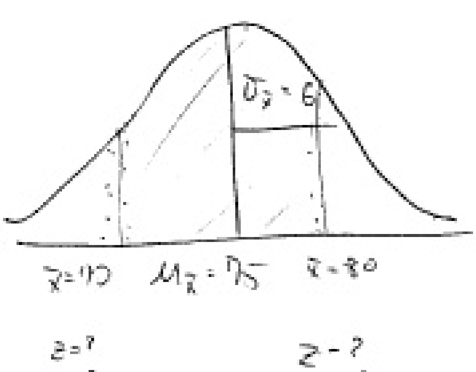
area beyond = .0918
× 2
.1836

∴ prop. bet = 1.0 − .1836 = .8164
or 81.64%

45.) pop of scores $\mu = 75$ $\sigma = 12$
for n = 4 sample

a) $p(70 < \bar{x} < 80)$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{12}{\sqrt{4}} = \frac{12}{2} = 6$



$z = \frac{70-75}{6} = \frac{-5}{6} = -.83$

$z = \frac{80-75}{6} = \frac{5}{6} = +.83$

area beyond = .2033
.2033
.4066

1.0 − .4066 = .5934

$p(-.83 < z < +.83)$
$= p(70 < \bar{x} < 80) = .5934$

15. b.) sample $n = 16$ $\quad p(70 < \bar{x} < 80)$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{12}{\sqrt{16}} = \frac{12}{4} = 3$

$$Z = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}} = \frac{70 - 75}{3} = \frac{-5}{3} = -1.67$$

$$Z = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}} = \frac{80 - 75}{3} = \frac{5}{3} = +1.67$$

area beyond Z is

$$\begin{array}{r} .0475 \\ .0475 \\ \hline .0940 \end{array} \qquad \begin{array}{r} 1.0000 \\ -.0940 \\ \hline \end{array}$$

total area

$p(-1.67 < Z < +1.67)$

$p(70 < \bar{x} < 80) = \boxed{.906}$

20) $\mu = 39.7$ years $\quad \sigma = 11.8$ $\quad$ dist. normal

trial jury $n = 12$ $\quad \bar{x} = 50.4$ years

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{11.8}{\sqrt{12}} = \frac{11.8}{3.46} = 3.41$

a) $p(\bar{x} \geq 50.4 \text{ years})$ $\quad Z = \frac{\bar{x} - \mu_{\bar{x}}}{\sigma_{\bar{x}}} = \frac{50.4 - 39.7}{3.41}$

$= \frac{10.7}{3.41} = 3.137$

20 a) $P(\bar{X} \geq 3.137) = \boxed{.0008}$
$\doteq 3.14$

b.) Yes, it is reasonable to conclude this jury is not a random sample

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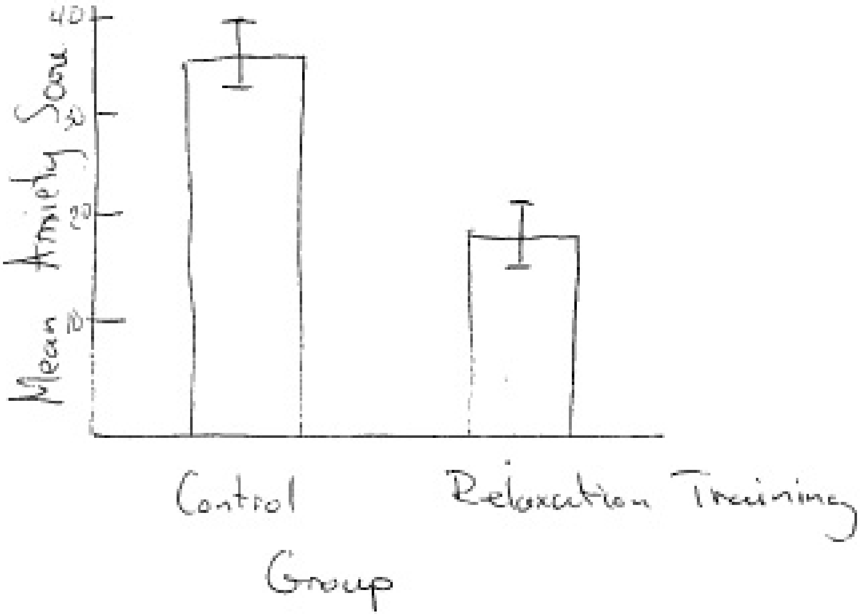

Does seem to have worked. No overlap in the standard error for the 2 groups