1) $\bar{X} \sim N\left(\mu, \frac{\sigma}{\sqrt{n}}\right)$ $\mu = 10$ $sd = 1$ $n = 16$

lower = 9,525

upper = 9,9

$$Z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$$

$$= \frac{\bar{x} - 10}{\frac{1}{\sqrt{16}}}$$

$P(9,525 < \bar{x} < 9.9) =$

$$P\left(\frac{9.525 - 10}{\frac{1}{\sqrt{16}}} < \frac{\bar{x} - 10}{\frac{1}{\sqrt{16}}} < \frac{9.9 - 10}{\frac{1}{\sqrt{16}}}\right)$$

$= P(-1.9 < Z < -0.4)$

$= P(Z < -0.4) - P(Z < -1.9)$

$= 0.3446 - 0.0287$

$= 0.3159$

2) The variance of the sample mean increases.
The larger the sample size, the smaller the variance and vice, versa

$sd = 0.4$

$n = 64 \rightarrow n = 36$

3) $P(X=1) = \binom{2}{1} c^{x}(1-c)^{2-x}$

$= 2c^{x}(1-c)^{2-x}$

$= 2c(1-c)$

$p = c$

$n = 2$

find $P(X=1)$

4) C

$20.7 \rightarrow 22.9$

As we increase the level of confidence, the confidence interval becomes bigger

5) B - LA Times reported a larger margin of error

Because as sample size increases, margin of error decreases. The more info you have, the more accurate

$C = 95\%$

CT, $n = 500$ LA, $n = 300$

sd = sd

margin of error?

$\frac{z * \sigma}{\sqrt{n}}$ $\frac{95 * \sigma}{\sqrt{300}}$ or $\frac{95 * \sigma}{\sqrt{500}}$

6) True, the standard deviations would be different in the 2 samples. The first would have a smaller sd, so also a smaller MOE.

7) (i) $\alpha = 0.05$

$Z = z_{\alpha/2} = 1.960$

$SE = \sigma/\sqrt{n} = 0.3/\sqrt{36} = 0.0500$

$MOE = E = Z * SE = 1.96 * 0.05 = 0.0980$

$2.6 - 0.098 = 2.5020$

$2.6 + 0.098 = 2.6980$

95% $(2.502 < \mu < 2.698)$

(ii) $\alpha = 0.01$

$Z = z_{\alpha/2} = 2.576$

$SE = \sigma/\sqrt{n} = 0.3/\sqrt{36} = 0.0500$

$MOE = E = z \times SE = 2.576 * 0.05 = 0.1288$

$2.6 - 0.1288 = 2.4712$

$2.6 + 0.1288 = 2.7288$

99% $(2.471 < \mu < 2.729)$

$sd = \sigma = 0.300$

$\varepsilon = 0.05$

$C = 95\%$

$1 - C = 5\%$

$Z = \frac{Z\cdot a}{2} = 1.960$

$n = \frac{1.96 * 0.3}{0.05^2} = 138.293$

need $n = 139$

8) $n = 15$ mean $= 73.3$ mph $sd = 3.2$

$\alpha = 0.1$

$\frac{Z\alpha}{2} = \frac{Z\,0.1}{2} = Z0.05 = 1.645$

$CI = \bar{x} - \frac{Z\alpha}{2}\frac{\sigma}{\sqrt{n}} < \mu < \bar{x} \times \frac{Z\alpha}{2}\frac{\sigma}{\sqrt{n}}$

$= 73.3 - 1.645\frac{3.2}{\sqrt{15}} < \mu < 73.3 + 1.645\frac{3.2}{\sqrt{15}}$

$= 73.3 - 1.645 \times 0.8269 < \mu < 73.3 + 1.645 \times 0.8269$

$\boxed{= 71.94 < \mu < 74.66}$

9) sd = 0.45 mL   Create 90% CI   MoE $\le$ 0.04

$$\bar{x} \pm \left(Z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}} \right)$$

necessary sample size = $\dfrac{(Z\ \text{score})^2 * SD \times (1-sd)}{MoE^2}$

90%

Z = 1.645

$$= \frac{1.645^2 * 0.45(1-0.45)}{0.04}$$

$$= \frac{2.7060 * 0.2475}{0.04}$$

$$= 16.74$$

n = 17 samples

10) sd = 30   n = 225

80%

Z = 1.28

$$\frac{30}{\sqrt{225}} = 2$$

$$Z * (2) = 1.28 * 2 = 2.56$$

so, 215 ± 2.56