HOME WORK 8

1. (9.6.8)

600 students

Coin to be tossed 100 times each.

CI = 95%

$\therefore \frac{95}{100} \times 600 = 570$

∴ The statement that approx. 570 of the CIs contain 0.5 is true.

2. (9.6.9)

$\sigma = 6$ feet

CI = 0.99

Length = 2 feet

$1 - \alpha = 0.99$

$\Rightarrow \alpha = 0.01$

$q = qnorm(1 - \frac{\alpha}{2})$

$= qnorm(1 - \frac{0.01}{2})$

$= 2.575829$

We know that -

$\bar{x} + q\frac{\sigma}{\sqrt{n}} - (\bar{x} - q\frac{\sigma}{\sqrt{n}}) = 2$

$\Rightarrow 2q\frac{\sigma}{\sqrt{n}} = 2$

$\Rightarrow \sqrt{n} = q\sigma$

$\Rightarrow n = (q\sigma)^2$

$\Rightarrow n = (2.575829 \times 6)^2$

$\Rightarrow n = 238.856221$

$\Rightarrow \boxed{n \simeq 239}$

∴ The SAHC needs atleast 1239 measurements to construct 99% CI where the length is 2 feet.

3. (a)

Null hypothesis :-

He doesn't have psychic power. He's answers are based on pure guessing.

$\boxed{H_0 : M \leq 0.2}$

Alternate hypothesis :-

He possess psychic ability.

$\boxed{H_a : M > 0.2}$

(b) $P(X \geq 25)$

$= 1 - P(X \leq 24)$

$= 1 - pbinom(24, 100, 0.2)$

$= \boxed{0.1313532}$

(c) Since the probability $\boxed{P(X \geq 25) < 0.2}$, we can say that the person doesn't demonstrated his power beyond reasonable doubt as we fail to reject null hypothesis.

4. CI = 95%

$\hat{p} = 0.58$ (58% of sample of 1009 Js adults)

$1 - \hat{p} = 0.42$

upper bound $= \hat{p} + q * \sqrt{\frac{\hat{p} \times (1 - \hat{p})}{n}}$

$= 0.58 + qnorm(0.975) * \sqrt{\frac{0.58 \times 0.42}{1009}}$

$= 0.6104$

$= \boxed{0.61}$

lower bound $= \hat{p} - q * \sqrt{\frac{\hat{p} \times (1-\hat{p})}{n}}$

$= 0.58 - qnorm(0.975) * \sqrt{\frac{0.58 \times 0.42}{1009}}$

$= 0.5495$

$\simeq \boxed{0.55}$

$\therefore$ 95% CI of US adults who supported same sex marriage is between 55% to 61%.