4. Annual precipitation totals for 25 random years in Iowa have a mean of 28.21" & we assume the pop. std. deviation is 6.74". Give a 94% conf. interval for the pop. mean. (Research shows these are approx. normal.)

$\bar{x} = 28.21$, $\sigma = 6.74$, $n = 25$ (too small), conf $= 0.94$, $\alpha = 0.06$

$1 - \alpha/2 = 1 - .06/2 = .97$

$E = z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}} = 1.88 \cdot \frac{6.74}{\sqrt{25}} = 2.53$

Table A1: $z \leftarrow .08$; $1.8 \leftarrow .9699 \approx .97$ $\Rightarrow z_{\alpha/2} = 1.88$

Conf int: $\bar{x} - E < \mu < \bar{x} + E$

$28.21 - 2.53 < \mu < 28.21 + 2.53$

$25.68 < \mu < 30.74$

We are 94% confident that the mean Iowa rainfall is between 25.68" and 30.74".

5. What sample size would give a 0.3" error at 98% confidence? ($\alpha = .02 \rightarrow 1 - \alpha/2 = .99$)

$n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2 = \left(\frac{2.33 \cdot 6.74}{0.3}\right)^2$

$= 2740.24 \rightarrow 2741$

Table A1: $.03$; $2.3 \leftarrow .9901 \approx .99$ $\Rightarrow z_{\alpha/2} = 2.33$

6. Construct a 95% conf. int for the mean weight of M&M candies. A random sample is as follows: {.903, .920, .861, 1.009, .971, .898, .942, .897}. Research shows these come from an approximately normal population.

$\bar{x} = 0.9251$, $s = .0471$, $n = 8$, conf $= .95$, $\alpha = .05$

σ unknown $\rightsquigarrow$ t-distrib. (Table A2)

$E = t_{\alpha/2} \frac{s}{\sqrt{n}} = 2.365 \cdot \frac{0.0471}{\sqrt{8}}$

$= .0394$

Table A2: df $= n - 1 = 7 \rightarrow 2.365$ ($\alpha = .05$, 2-tail)

Conf int: $\bar{x} - E < \mu < x + E$

$.9251 - .0394 < \mu < .9251 + .0394$

$.8857 < \mu < .9645$

We are 95% confident that the mean M&M weight is between 0.8857 & 0.9645 grams.