16. 解：

(1)

由题意知，$X \sim N(\mu, \sigma^2)$，且 $\frac{\overline{X}-\mu}{\sigma/\sqrt{n}} \sim N(0,1)$，有，

$$P(\underline{\theta} < \theta < \overline{\theta}) = 1 - \alpha$$

即，

$$P(-z_{\frac{\alpha}{2}} < \frac{\overline{X}-\mu}{\sigma/\sqrt{n}} < z_{\frac{\alpha}{2}}) = 1 - \alpha$$

故，

$$P(\overline{X} - \frac{\sigma}{\sqrt{n}} z_{\frac{\alpha}{2}} < \mu < \overline{X} + z_{\frac{\alpha}{2}}) = 1 - \alpha$$

令 $n = 9, \sigma = 0.6, 1 - \alpha = 0.95$，得 $\frac{\alpha}{2} = 0.025, z_{0.025} = 1.96, \overline{x} = 6$，故置信区间为，

$$(6 \pm \frac{0.6}{3} z_{0.025}) = (5.608, 6.392)$$

(2)

由题意，$\frac{\overline{X}-\mu}{S/\sqrt{n}} \sim t(n-1)$，故，

$$P(-t_{\frac{\alpha}{2}}(n-1) < \frac{\overline{X}-\mu}{S/\sqrt{n}} < t_{\frac{\alpha}{2}}(n-1)) = 1 - \alpha$$

故有，

$$P(\overline{X} - \frac{S}{\sqrt{n}} t_{\frac{\alpha}{2}} < \mu < \overline{X} + \frac{S}{\sqrt{n}} t_{\frac{\alpha}{2}}) = 1 - \alpha$$

令 $n = 9, 1 - \alpha = 0.95, \frac{\alpha}{2} = 0.025, t_{\frac{\alpha}{2}}(8) = 2.306$，算得 $\overline{x} = 6, s = \sqrt{0.33}$，故置信区间为，

$$(6 \pm \frac{\sqrt{0.33}}{3} t_{0.025}(8)) = (5.558, 6.442)$$

18. 解:

由题意知，$\frac{(n-1)S^2}{\sigma^2} \sim \chi^2(n-1)$

$$P(\chi^2_{1-\frac{\alpha}{2}}(n-1) < \frac{(n-1)S^2}{\sigma^2} < \chi^2_{\frac{\alpha}{2}}(n-1)) = 1-\alpha$$

故，

$$P(\frac{(n-1)S^2}{\chi^2_{\frac{\alpha}{2}}(n-1)} < \sigma^2 < \frac{(n-1)S^2}{\chi^2_{1-\frac{\alpha}{2}}(n-1)}) = 1-\alpha$$

令 $n=9, s=11, 1-\alpha=0.95, \frac{\alpha}{2}=0.025, \chi^2_{\frac{\alpha}{2}}(n-1)=17.535, \chi^2_{1-\frac{\alpha}{2}}(n-1)=2.180$，故，

$$(\frac{\sqrt{n-1}S}{\sqrt{\chi^2_{\frac{\alpha}{2}}(n-1)}}, \frac{\sqrt{n-1}S}{\sqrt{\chi^2_{1-\frac{\alpha}{2}}(n-1)}}) = (7.4, 21.1)$$

19. 解:

(1)

由题意知，$X_i \sim N(\mu, \sigma^2)$，故，$\frac{X_i-\mu}{\sigma} \sim N(0,1)$，故，

$$\sum_{i=1}^{n}(\frac{X_i-\mu}{\sigma})^2 \sim \chi^2(n)$$

故，

$$P(\chi^2_{1-\frac{\alpha}{2}} < \sum_{i=1}^{n}\frac{(X_i-\mu)^2}{\chi^2_{\frac{\alpha}{2}}(n)} < \chi^2_{\frac{\alpha}{2}}(n)) = 1-\alpha$$

故置信区间为，

$$(\frac{\sum_{i=1}^{n}(X_i-\mu)^2}{\chi^2_{\frac{\alpha}{2}}(n)}, \frac{\sum_{i=1}^{n}(X_i-\mu)}{\chi^2_{1-\frac{\alpha}{2}}(n)})$$