You are given the following information:

<table>
<thead>
<tr>
<th>Sample 1</th>
<th>Sample 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n_1 = 14$</td>
<td>$n_2 = 14$</td>
</tr>
<tr>
<td>$S_1 = 2.5$</td>
<td>$S_2 = 1.8$</td>
</tr>
<tr>
<td>$\bar{x}_1 = 17.2$</td>
<td>$\bar{x}_2 = 15.9$</td>
</tr>
</tbody>
</table>

a. Test using $\alpha = 10\%$ to determine whether there is a difference between the two population means.

1. **Hypothesis:** $H_0 : \mu_1 - \mu_2 = 0$ VS $H_A : \mu_1 - \mu_2 \neq 0$

2. **Test Statistics:**

   
   $$
   t_C = \frac{\bar{x}_1 - \bar{x}_2}{S_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}},
   $$

   
   $$
   S_p = \sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}} = \sqrt{\frac{(14 - 1)(2.5)^2 + (14 - 1)(1.8)^2}{14 + 14 - 2}}
   $$

   
   $$
   = \sqrt{4.745} = 2.1783
   $$

   
   $$
   So, t_C = \frac{17.2 - 15.9 - 0}{(2.1783) \sqrt{\frac{1}{14} + \frac{1}{14}}} = 1.5790
   $$

3. **Decision Rule:** Reject $H_0$ if $|t_C| > t_{\alpha/2, n_1 + n_2 - 2}$ where

   
   $$
   t_{\alpha/2, n_1 + n_2 - 2} = t_{0.05, 26} = 1.7056
   $$

4. **Decision:** because $1.5790 < 1.7056$ do not reject $H_0$

5. **Conclusion:** there is no difference between the two population means

b. State the required assumptions needed to perform the test in (a)

1. The two populations are normally distributed
2. Population variances are unknown but equal
3. Samples are small and independent.