HYPOTHESIS TESTING FOR THE MEAN OF A POPULATION

A brand of water comes in bottles. The amount of water follows a normal distribution of mean \( \mu \) and sd \( \sigma \). The manufacturer takes a sample of 15 bottles and finds the mean to be 124.2 ml. Test at the 5% level whether or not there is evidence that the value of \( \mu \) is lower than the manufacturer's claim that \( \mu = 125 \).

Hypothesis:

- \( H_0: \mu = \ldots \) NULL
- \( H_1: \mu > \ldots \) ALT.

The aim is...

- \( \bar{x} \sim N(\mu, \sigma^2/n) \)

\( \bar{x} \) is 'weird' enough to allow us to reject \( H_0 \)

\( \bar{x} \) is 'weird' enough to allow us to reject the idea that the population mean is \( \mu \)

Conclusion:
- Compare
- Do/do not reject \( H_0 \)
- Conclusion in context
### Hypothesis Testing for Zero Correlation

**Sample PMCC**: $r = 0.78$, suggesting a likely linear relationship within the sample population.

**Null Hypothesis** ($H_0$): $p = 0$  
**Alternative Hypothesis** ($H_1$): $p > 0$

#### Check Significance

- **Critical Value for $r$**: $r_{cr}$
- **If $-1 < r < -r_{cr}$**: There is evidence $p < 0$  
  - **Reject $H_0$**.
- **If $r < r_{cr}$**: There is evidence $p > 0$  
  - **Reject $H_0$**.

#### Your Conclusion Must Have 3 Stages

1. **Compare** calculated $r$ with $r_{cr}$.
2. **Reject $H_0$?**
3. **Context**

#### Data Table

<table>
<thead>
<tr>
<th>$x$ (age in years)</th>
<th>30</th>
<th>52</th>
<th>38</th>
<th>48</th>
<th>56</th>
<th>44</th>
<th>41</th>
<th>25</th>
<th>32</th>
<th>27</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y$ (annual salary in thousands of pounds)</td>
<td>32</td>
<td>38</td>
<td>40</td>
<td>34</td>
<td>35</td>
<td>32</td>
<td>28</td>
<td>27</td>
<td>29</td>
<td>41</td>
</tr>
</tbody>
</table>

It is suggested that there is no correlation between age and salary. Test this at the 5% level.

#### Calculation

- **$H_0$**:
- **$H_1$**:

- **From Table**

- **Calculator**