Example 6
Confidence intervals
Population standard deviation not known

Does the new substance added to the diet of infants influence their weight gain? Same setup as example 5 except this time we do not know the population standard deviation.

14.2	295.7
15.0	400.1
22.4	412.5
25.2	422.0
53.4	423.4
104.5	451.3
119.9	455.0
152.2	463.5
153.6	477.0
154.0	481.0
197.5	500.4
233.0	509.0
234.8	521.2
236.8	532.8
283.4	591.0
284.0	760.9

n=32
x=311.89 g
s=197.19 g

$$\mu = \overline{x} \pm t_{\alpha,\nu} s_{\overline{x}}$$

$$s_{\overline{x}} = \frac{s}{\sqrt{n}} = \frac{197.19}{\sqrt{32}} = \frac{197.19}{5.657} = 34.86$$

To get the value of t you need to calculate ν (degrees of freedom)

$$\nu = n - 1$$
$$\nu = 32 - 1 = 31$$

Then go to table B

Look down the first column (ν) until you find the value of your ν.

If your exact ν is not on the table select the next smaller ν. For this example that would be 30.

Then look across the row with your ν until it intersects the column headed by the correct α (in this case if we want to be 95% (0.95%) certain look for the column headed by 5% (0.05).

$t_{0.05,\,31}=2.042$

$$\mu = 311.89 \pm 2.042(34.86)$$

Lower limit = 311.89-(2.042)(34.86)=240.71 g
Upper limit = 311.89+(2.042)(37.86)=383.07 g

95% interval = 240.7 - 383.0 g