Stat 1040: Review for Quiz 9

1. A certain night-time cold medicine bears a label indicating the presence of 500 mg of acetaminophen in each fluid ounce of the drug. The FDA randomly selects 65 one-ounce samples and finds that the average acetaminophen content is 589 mg, with a standard deviation of 21 mg. As a statistician for the FDA what do you recommend?

Stat 1040: Review for Quiz 9

1. A certain night-time cold medicine bears a label indicating the presence of ~~500~~ 600 mg of acetaminophen in each fluid ounce of the drug. The FDA randomly selects 65 one-ounce samples and finds that the average acetaminophen content is 589 mg, with a standard deviation of 21 mg. As a statistician for the FDA what do you recommend?

volume amount → Draw 65 & consider the AV of draws

Null: Box AV = 600

Alternative: Box AV < 600

Test statistic is

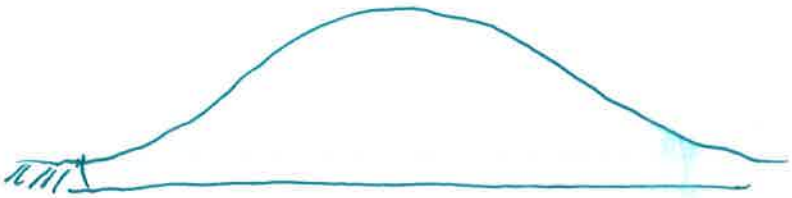
$$\frac{\text{AV of draws} - \text{EV for AV}}{\text{SE for AV}}$$

EV for AV = 600 mg

$$\text{SE for AV} = \frac{\text{Box SD} \times \sqrt{65}}{65} \approx \frac{(21)\sqrt{65}}{65} = 2.6$$

p-value

$$\frac{589 - 600}{2.6} = -4.2$$



-4.2

p-value ≈ 0 !

Reject the null.

Z-test

2. Most water treatment facilities monitor the quality of their drinking water on an hourly basis. One variable monitored is pH, which measure the degree of alkalinity or acidity in the water. A pH below 7.0 is acidic, a pH above 7.0 is alkaline, and a pH of 7.0 is neutral. One water treatment plant has a target pH of 8.5 (most try to maintain a slightly alkaline level). For one of the hourly tests, 17 water samples were tested. The results are AV = 8.24 and SD = .15 . Does this sample provide sufficient evidence that the average of pH level in the water differs from 8.5?

2. Most water treatment facilities monitor the quality of their drinking water on an hourly basis. One variable monitored is pH, which measures the degree of alkalinity or acidity in the water. A pH below 7.0 is acidic, a pH above 7.0 is alkaline, and a pH of 7.0 is neutral. One water treatment plant has a target pH of 8.5 (most try to maintain a slightly alkaline level). For one of the hourly tests, 17 water samples were tested. The results are AV = 8.24 and SD = .15 . Does this sample provide sufficient evidence that the average of pH level in the water differs from 8.5?

pH measurements 000 → Draw 17 & consider AV of draws.

Null : Box AV = 8.5 Alternate : Box AV < 8.5

Test statistic : The $\frac{\text{AV of Draws} - \text{EV for AV}}{\text{SE for AV}}$

follows t-curve, df = 16

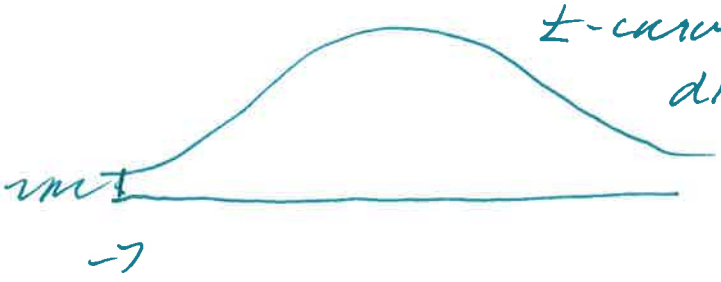
EV for AV = 8.5

$\text{SE for AV} = \frac{\text{box SD} \times \sqrt{17}}{17} \approx \frac{(\text{sample SD}^+)\sqrt{17}}{17}$

$\text{sample SD}^+ = \sqrt{\frac{17}{16}}(.15) = .155$

$\text{SE for AV} = \frac{(.155)\sqrt{17}}{17} = .037$

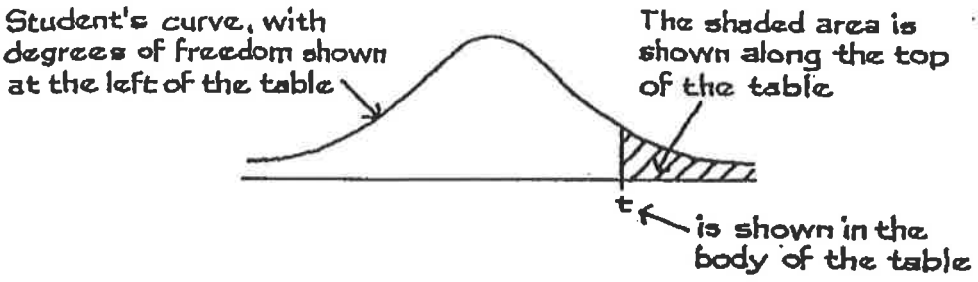
p-value : $\frac{8.24 - 8.5}{.037} = |-7|$



p-value ≈ 0

Reject!

A *t*-TABLE



Degrees of freedom	*25%*	*10%*	*5%*	*2.5%*	*1%*	*0.5%*
1	1.00	3.08	6.31	12.71	31.82	63.66
2	0.82	1.89	2.92	4.30	6.96	9.92
3	0.76	1.64	2.35	3.18	4.54	5.84
4	0.74	1.53	2.13	2.78	3.75	4.60
5	0.73	1.48	2.02	2.57	3.36	4.03
6	0.72	1.44	1.94	2.45	3.14	3.71
7	0.71	1.41	1.89	2.36	3.00	3.50
8	0.71	1.40	1.86	2.31	2.90	3.36
9	0.70	1.38	1.83	2.26	2.82	3.25
10	0.70	1.37	1.81	2.23	2.76	3.17
11	0.70	1.36	1.80	2.20	2.72	3.11
12	0.70	1.36	1.78	2.18	2.68	3.05
13	0.69	1.35	1.77	2.16	2.65	3.01
14	0.69	1.35	1.76	2.14	2.62	2.98
15	0.69	1.34	1.75	2.13	2.60	2.95
16	0.69	1.34	1.75	2.12	2.58	2.92
17	0.69	1.33	1.74	2.11	2.57	2.90
18	0.69	1.33	1.73	2.10	2.55	2.88
19	0.69	1.33	1.73	2.09	2.54	2.86
20	0.69	1.33	1.72	2.09	2.53	2.85
21	0.69	1.32	1.72	2.08	2.52	2.83
22	0.69	1.32	1.72	2.07	2.51	2.82
23	0.69	1.32	1.71	2.07	2.50	2.81
24	0.68	1.32	1.71	2.06	2.49	2.80
25	0.68	1.32	1.71	2.06	2.49	2.79