

11.33

a)

| | |
|----|-------|
| 9 | 2 |
| 9 | 5 7 8 |
| 10 | 0 2 4 |
| 10 | 5 5 |
| 11 | 1 |
| 11 | 9 |
| 12 | 2 |

b) μ = mean reading of all detectors of this type.

$H_0: \mu = 105$ (detectors are accurate)

$H_a: \mu \neq 105$ (mean reading differs \rightarrow not accurate)



$n = 12$
 $\bar{x} = 104.13$
 $S_x = 9.397$

$t = \frac{104.13 - 105}{9.397 / \sqrt{12}} = -0.3195$
 p-value $> .50$

$2 \cdot \Pr(t > 0.3195) = .7554$ (p-value)

.7554 is not sign. at any reasonable level. There is no evid. against H_0 .
 So I fail to reject H_0 .

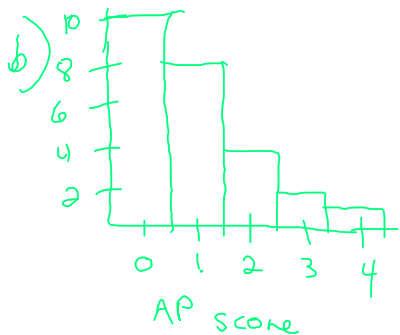
There is no evid. to suggest the
 - mean reading level differs from 105.

\rightarrow assume the 12 detectors are randomly selected from these type of detectors.

$\rightarrow n = 12 < 30$
 sample is a little skewed, ind. pop. may not be normal. Problem states not enough to make the t-test invalid.

11.36

a) Yes, if the 25 are an SRS of AP exam papers.



Based on this sample, the pop. is probably not normal. They appear skewed right.

c)

$$\bar{x} = 1.04$$

$$s_x = 1.14$$

$$n = 25$$

$$df = 24$$

$$1.04 \pm 2.064 \left(\frac{1.14}{\sqrt{25}} \right)$$

$$(.569, 1.511)$$

I am 95% conf. the mean score on this question is between .569 and 1.511.

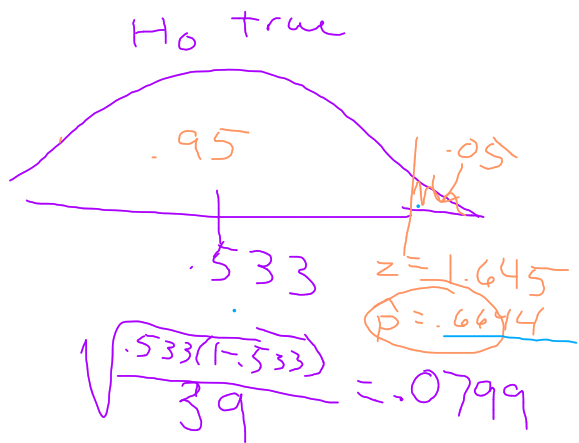
* While the $n = 25$ (< 30) and the sample is skewed right, indicated the pop. prob. isn't normal, the absence of outliers and moderate n will allow us to use the t -dist. as a fairly good approx.

$H_0: p = .533$
 $H_a: p > .533$

($p = .533$) F ($p = .60$)

| | | |
|--------------------|-----|-----------|
| | F | \bar{F} |
| rej H_0 | .05 | .2061 |
| fail. to rej H_0 | .95 | .7939 |

power

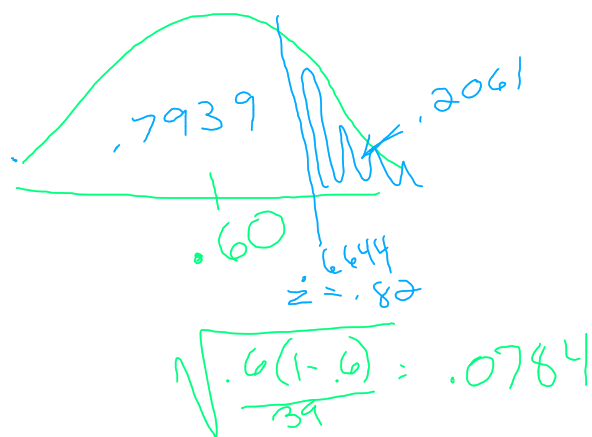


$\text{invnorm}(.95) = 1.645$

$$z = \frac{\hat{p} - .533}{.0799} = 1.645$$

$\hat{p} = .6644$

H_0 false



$$z = \frac{.6644 - .60}{.0784} = .82$$

$\text{Pr}(z > .82) = .2061$

ok if total pop. is normal!

Small $n \leq 15$

med $15 \leq n \leq 30$ (or 40)

ok! \leftarrow large $n \geq 30$ (or 40)

in order to use t:

- Sample should not be skewed or have outliers

- Sample shouldn't have extreme skew or outliers.

- don't care about shape of pop, so sample can look however it wants!