1. THIS IS A BINOMIAL PROBLEM, SO $\bar{p} = \frac{x}{n} = \frac{142}{250} = 0.568$.

$s^2 = \bar{p}(1-\bar{p}) = 0.568 \cdot 0.432 \approx 0.2454$. A 99% CONFIDENCE INTERVAL (2 TAILS) REQUIRES $z_{\frac{0.01}{2}} = z_{0.005}$, WHICH IS RIGHT BETWEEN -2.58 AND -2.57, SO WE USE -2.575.

$$C.I._{99\%} = \bar{p} \pm E, \quad E = z_{\frac{\alpha}{2}} \frac{s}{\sqrt{n}} = 2.575 \frac{\sqrt{0.2454}}{\sqrt{250}} \approx 0.0807$$

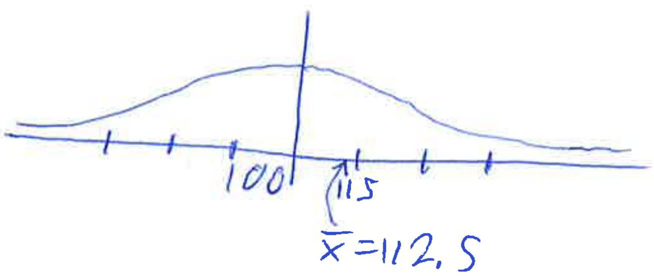
$$C.I._{99\%} = (0.568 - 0.0807, 0.568 + 0.0807) = (0.4873, 0.6487).$$

WE ARE 99% SURE THAT 48.73 TO 64.87 PERCENT OF TEACHERS FEEL THAT COMPUTERS ARE ESSENTIAL.

2. $H_0 : \mu = 100$. (H_0 IS ALWAYS THE NEUTRAL STATEMENT)

$H_1 : \mu > 100$.

THIS TELLS YOU IT'S A ONE-TAILED TEST.



SINCE THERE'S NO α GIVEN, USE $\alpha = 5\% = 0.05$.

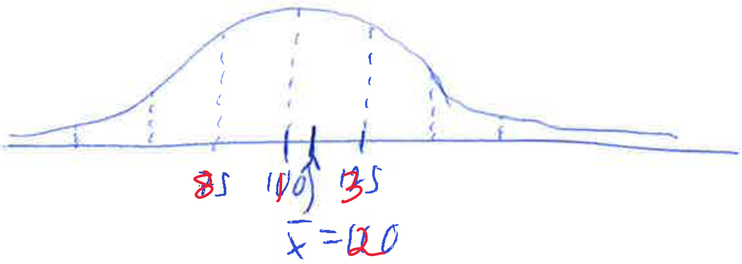
THE ONE-TAIL REJECTION REGION AT $z_{0.05}$ IS OBTAINED FROM A Z-TABLE, 1.645.

$$z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} = \frac{112.5 - 100}{15/\sqrt{30}} \approx 4.56.$$

SINCE $4.56 > 1.65$, WE ARE IN THE REJECTION REGION (THE TAIL) AND WE REJECT H_0. THERE IS SUFFICIENT EVIDENCE IN SUPPORT OF THE PRINCIPAL'S CLAIM.

3. $H_0: \mu = 110$

$H_1: \mu \neq 110$ (TWO-TAILS)



SET $\alpha = 0.05$, SINCE IT'S NOT MENTIONED, TWO TAILS AT TOTAL 5% MEANS 2.5% EACH TAIL.

$Z_{0.025} = -1.96$, SO REJECT H_0 IF $Z < -1.96$ OR $Z > 1.96$.

$$Z = \frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}} = \frac{120 - 110}{25/\sqrt{20}} \approx 1.79.$$

SINCE Z IS NOT IN THE REJECTION ZONE, WE DO NOT REJECT H_0. THERE IS NOT SUFFICIENT EVIDENCE TO SUPPORT THE CLAIM.

DISCUSSION: 1.79 IS CLOSE TO 1.96, SO IT WOULDN'T TAKE MUCH TO CHANGE THE RESULT. 1.79 IS OBTAINED BY $\frac{\bar{x} - \mu_0}{\sigma/\sqrt{n}}$, SO FOR EXAMPLE IF n WERE INCREASED AND $\bar{x}$ DOESN'T CHANGE, Z WOULD INCREASE.

4. FOR WOMEN, WE FIND $\bar{x}_w = 22.29$ AND STANDARD DEVIATION $S_w = 5.32$. FOR MEN, $\bar{x}_M = 14.95$, $S_M = 6.84$.

THE POOLED STANDARD DEVIATION IS

$$S_p^2 = \frac{(n_w - 1)S_w^2 + (n_M - 1)S_M^2}{n_w + n_M - 2} = 38.88 \Rightarrow S_p = 6.24$$

$H_0: \mu_M - \mu_W = 0$; $H_1: \mu_M - \mu_W \neq 0$. (TWO TAILS)

WE POOL, REMEMBER, BECAUSE WE WILL CONSIDER THE <u>DIFFERENCES</u> AND MAKE ONE GROUP, SO THE GROUP MEAN IS $\bar{x} = 22.29 - 14.95 = 7.34$.

THE t-STATISTIC IS $t = \dfrac{\bar{x}}{S_p\sqrt{\frac{1}{n_W}+\frac{1}{n_M}}} = 2.8$

$df = n_W + n_M - 2 = 21$. USING $\alpha = 0.05$, WE FIND A t-VALUE ON THE TABLE (OR IN R) OF $t_{0.05, 21} = 2.08$

SINCE $2.8 > 2.08$, WE REJECT THE NULL HYPOTHESIS THAT $\mu_M - \mu_W = 0$ AND SAY THERE IS SUFFICIENT EVIDENCE FOR THE BODY FAT PERCENTAGE OF MEN TO BE DIFFERENT FROM THAT OF WOMEN.