2.

Solution : (a) decision : judge the student is female

denote the probability that my decision is wrong is $p(e)$

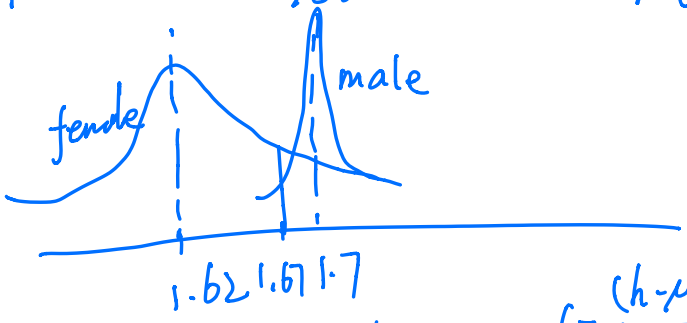
$$p(e) = \frac{300}{300+700} = \frac{3}{10}$$

(b) decision : judge the student is male

(c) decision : judge the student is female ?

prior probabilities

$$p(\text{Male}) = \frac{300}{1000} = 0.3 \qquad p(\text{female}) = \frac{700}{1000} = 0.7$$



$$f(h|\mu,\sigma) = \frac{1}{\sigma\sqrt{2\pi}} e^{\left(-\frac{(h-\mu)^2}{2\sigma^2}\right)}$$

$$f_{\text{male}}(h|\mu,\sigma) = \frac{1}{0.2\sqrt{2\pi}} \cdot e^{-\frac{(1.67-1.7)^2}{2\times 0.2^2}} \approx 1.9724$$

$$f_{\text{female}}(h|\mu,\sigma) = \frac{1}{0.3\sqrt{2\pi}} e^{-\frac{(1.67-1.62)^2}{2\times 0.3^2}} \approx 1.3115$$

$$P(\text{gender}|h) = \frac{P(\text{gender})\,P(h|\text{gender})}{P(h)}$$

$$R = \frac{P(\text{male}|h)}{P(\text{female}|h)} = \frac{0.3 \times 1.9724}{0.7 \times 1.3115} = 0.6445 < 1$$

$\therefore$ female