Still no Peter 15

$$f_{X|H}(x|h_0) = \frac{1}{2}\exp\left(-\frac{x}{2}\right), \quad x \geq 0$$

$$f_{X|H}(x|h_1) = \frac{1}{4}\exp\left(-\frac{x}{4}\right), \quad x \geq 0$$

We want to test hypotheses on two independent samples X_1 and X_2

observe $\underline{X} = [X_1, X_2]^T$

$\frac{1}{2}\exp\left(-\frac{x}{2}\right) = \frac{1}{4}\exp\left(-\frac{x}{4}\right) = \text{approx } 2.5$

a) Joint conditional pdf of both observations

Write

$$f_X(x) = \sum_{k=0}^{k-1} f_{X|H}(x|h_k) P_k$$

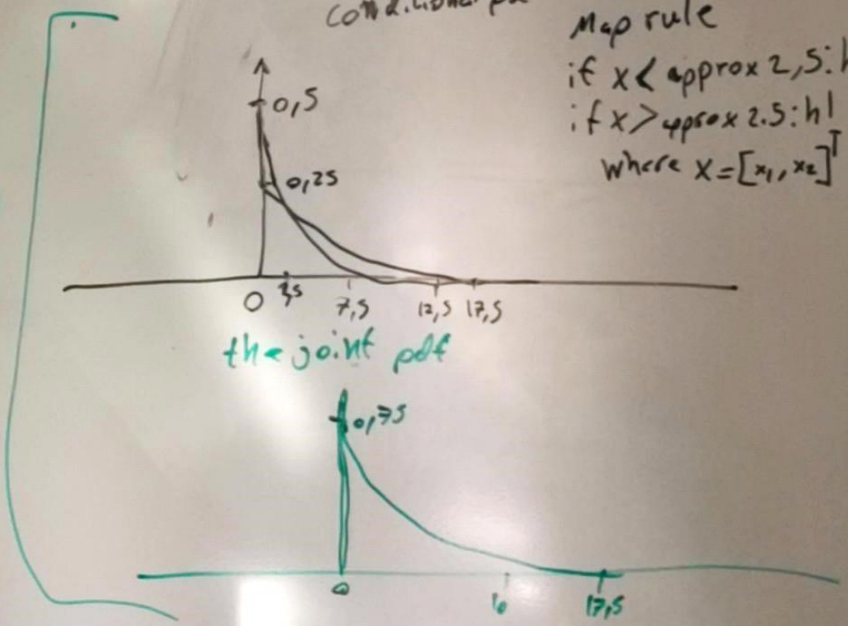
$$= f_{X|H}(x|h_0) \cdot P_1 + f_{X|H}(x|h_1) \cdot P_2$$

b) Sketch 2D plot

if unequal probability

$P(H=h_0) \neq P(H=h_1)$

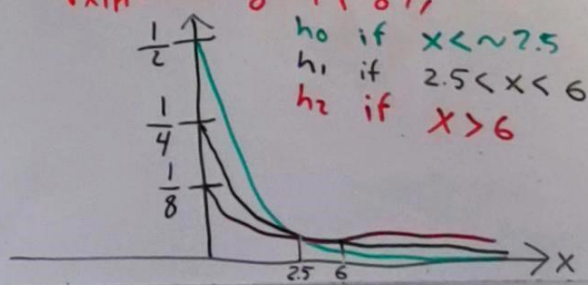
Depends on what P_k is as it would value the conditional pdfs differently changing max rule and joint pdf



Map rule
if $x <$ approx 2,5: h_0
if $x >$ approx 2.5: h_1
where $x = [x_1, x_2]^T$

c) What is the decision region with another hypothesis:

$$f_{X|H}(x|h_2) = \frac{1}{8}\exp\left(-\frac{x}{8}\right), \quad x \geq 0$$



h_0 if $x < \sim 2.5$
h_1 if $2.5 < x < 6$
h_2 if $x > 6$

d) John p