

(b) Bayes error rate
 $= P(\hat{f}(x) \neq Y)$ for MAP classifier

$$= P(Y = \text{cpu}) = 0.3$$

$$(c) P(FA) = P(\hat{f}(x) = \text{cpu} | Y = \text{powersupply}) = 0$$

$$P(MD) = P(\hat{f}(x) = \text{powersupply} | Y = \text{cpu}) = 1$$

(4) FAIRNESS ~~error~~

$$P(Y=1 | A=1) = \frac{2}{3}$$

GIVEN $A=1$

NOT TOLD: $A=0$

	$P(\hat{Y}=0 Y, A=1)$	$P(\hat{Y}=1 Y, A=1)$
$Y=0$	0.8	0.2
$Y=1$	0.4	0.6

$$P(Y=1 | \hat{Y}=1, A=1) = \frac{P(Y=1, \hat{Y}=1 | A=1)}{P(\hat{Y}=1 | A=1)}$$

$$= \frac{P(Y=1 | A=1) P(\hat{Y}=1 | Y=1, A=1)}{P(Y=1 | A=1) P(\hat{Y}=1 | Y=1, A=1) + P(Y=0 | A=1) P(\hat{Y}=1 | Y=0, A=1)}$$

$$= \frac{\left(\frac{2}{3}\right)(0.6)}{\left(\frac{2}{3}\right)(0.6) + \left(\frac{1}{3}\right)(0.2)}$$

Demo. Per. $P(\hat{Y}=1 | A=1) = P(\hat{Y}=1 | A=0)$
 if \hat{Y} may not be fair

Equal odds $P(\hat{Y}=1 | Y=1, A=1) = P(\hat{Y}=1 | Y=1, A=0)$
 if \hat{Y} fair