

Probability & Statistics

Post-Class Problems 1/29/10 due 2/2/10

Sec 1.5 #5, 7, 9

Sec 2.1 #5, 9, 11ab

$$\begin{aligned} 1.5 \quad 5) P(\text{critical} | \text{died}) &= \frac{P(\text{critical} \cap \text{died})}{P(\text{died})} \\ &= \frac{.20 \cdot .30}{.20 \cdot .30 + .30 \cdot .10 + .50 \cdot .01} \\ &= \frac{.060}{.095} = \frac{12}{19} = \boxed{0.032} \end{aligned}$$

$$\begin{aligned} 1.5 \quad 7) P(\text{smoker} | \text{dies}) &= \frac{P(\text{smoker} \cap \text{dies})}{P(\text{dies})} \\ &= \frac{.10 \cdot .05}{.10 \cdot .05 + .90 \cdot .0005} \\ &= \frac{.0050}{.0095} = \frac{10}{19} = \boxed{0.520} \end{aligned}$$

$$\begin{aligned} 1.5 \quad 9) \quad a) P(\text{diseased} | \text{test positive}) &= \frac{P(\text{diseased} \cap \text{test positive})}{P(\text{test positive})} \\ &= \frac{.0005 \cdot .99}{.0005 \cdot .99 + .03 \cdot .9995} \\ &= \boxed{0.016} \end{aligned}$$

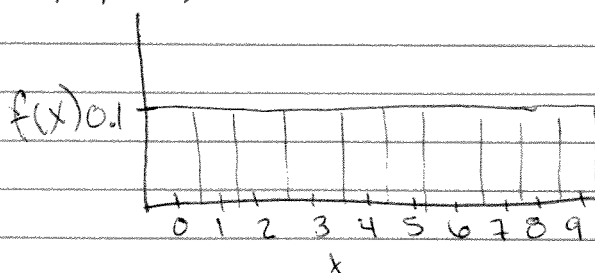
$$\begin{aligned} b) P(\text{not diseased} | \text{test positive}) &= 1 - P(\text{diseased} | \text{test positive}) \\ &= 1 - 0.016 \\ &= \boxed{0.984} \end{aligned}$$

2.1 5) Let X denote the outcome when a single ^{digit} is generated

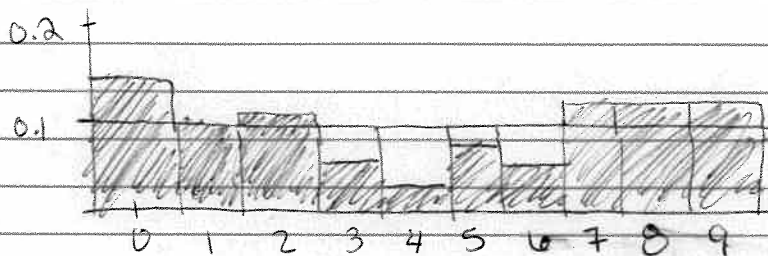
a) $f(x) = \frac{1}{10}$ for $x = 0, 1, 2, \dots, 9$

b)

0	21
1	15
2	16
3	13
4	6
5	15
6	13
7	17
8	17
9	17



2.1 5) continued
c)



d) $\mu = E(x)$
 $= \sum_{i=0}^9 x_i f(x_i) = 4.5$
 $\bar{x} = \frac{671}{150} = 4.473$
 $\sigma^2 = E(x^2) - E(x)^2$
 $= \sum_{i=0}^9 x_i^2 f(x_i) - 4.5^2$
 $= 28.5 - 4.5^2$
 $= 8.25$

$s_x^2 = 9.6067$

e) 8, 13, 15, 10, 12, 10, 4, 9, 15, 0
 $\bar{y} = 3.9375, s_y^2 = 6.9645$

2.1 9) $P(\text{no def}) = \frac{95C_{10}}{100C_{10}}$

$P(\geq 1 \text{ defect}) = 1 - P(\text{no defect})$
 $= 0.41625$

2.1 11) a) $f(y) = \frac{365!(y-1)!}{(365-y)! \cdot 365^y}, y = 2, 3, \dots, 366$
 b)