

1/31/2025

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

$$P(Y=1 | A=0) = \frac{1}{9}, \quad P(Y=1 | A=1) = \frac{11}{20}$$

$$P(f(x)=1 | A=1) = P(f(x)=1 | A=0) = \frac{1}{2}$$

$$P(f(x)=1 | Y=1, A=1) = P(f(x)=1 | Y=1, A=0) = \frac{7}{8}$$

What is $P(Y=1 | f(x)=1, A=1)$?

A=1 case

		$f(x)$		
		0	1	
Y	0		$\frac{3}{160}$	$\frac{9}{20}$
	1	$\frac{11}{20} \cdot \frac{1}{8} = \frac{11}{160}$	$\frac{11}{20} \cdot \frac{7}{8} = \frac{77}{160}$	$\frac{11}{20}$
		$\frac{1}{2}$	$\frac{1}{2} = \frac{80}{160}$	

$$P(Y=1 | f(x)=1, A=1) = \frac{77/160}{80/160} = \frac{77}{80}$$

$$P(f(x)=1 | Y=1, A=1) =$$

$$\frac{P(f(x)=1 | A=1) \cdot P(Y=1 | f(x)=1, A=1)}{P(Y=1 | A=1)}$$