MORE BINOMIAL PROBABILITY
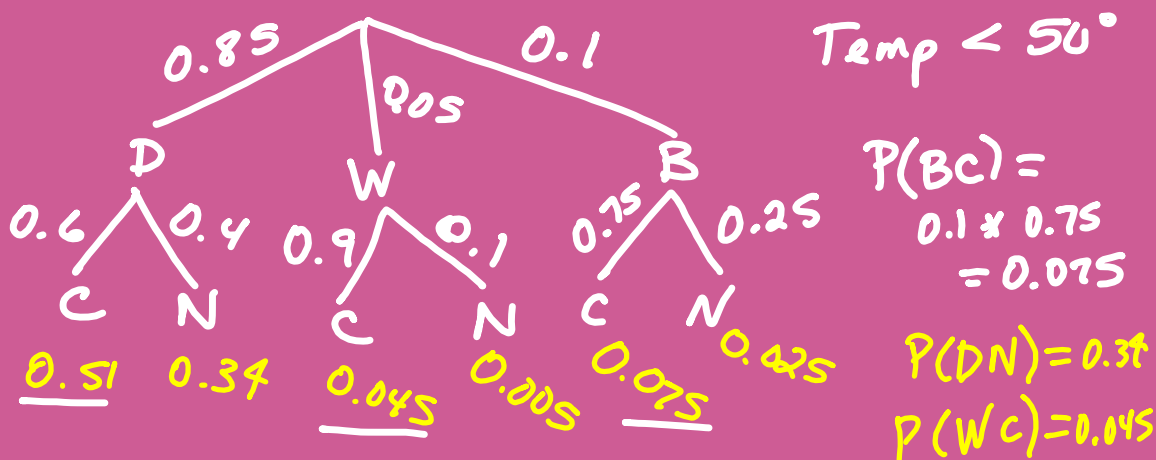
Prob (ticket when pulled over in Nemah County) $= \frac{2}{3}$

What is the prob of a teen getting a ticket at least 3 of the next 5 times he/she is pulled over?

write out all possibilities →

$$_5C_3 T^3 N^2 \quad \text{OR} \quad _5C_4 T^4 N^1 \quad \text{OR} \quad _5C_5 T^5 N^0$$

$$_5C_3 \left(\frac{2}{3}\right)^3 \left(\frac{1}{3}\right)^2 + _5C_4 \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right)^1 + 1\left(\frac{2}{3}\right)^5$$

$$\approx 0.790$$

PROBABILITY TREES + CONDITIONAL PROBABILITY

Temp $< 50°$

0.85 $\quad 0.05 \quad$ 0.1

D $\qquad$ W $\qquad$ B

$0.6 \quad 0.4 \qquad 0.9 \quad 0.1 \qquad 0.75 \quad 0.25$

C $\quad$ N $\qquad$ C $\quad$ N $\qquad$ C $\quad$ N

$\underline{0.51} \quad 0.34 \qquad \underline{0.045} \quad 0.005 \qquad \underline{0.075} \quad 0.025$

$P(BC) =$
0.1×0.75
$= 0.075$

$P(DN) = 0.34$
$P(WC) = 0.045$

$P(C) = DC \text{ OR } WC \text{ OR } BC$
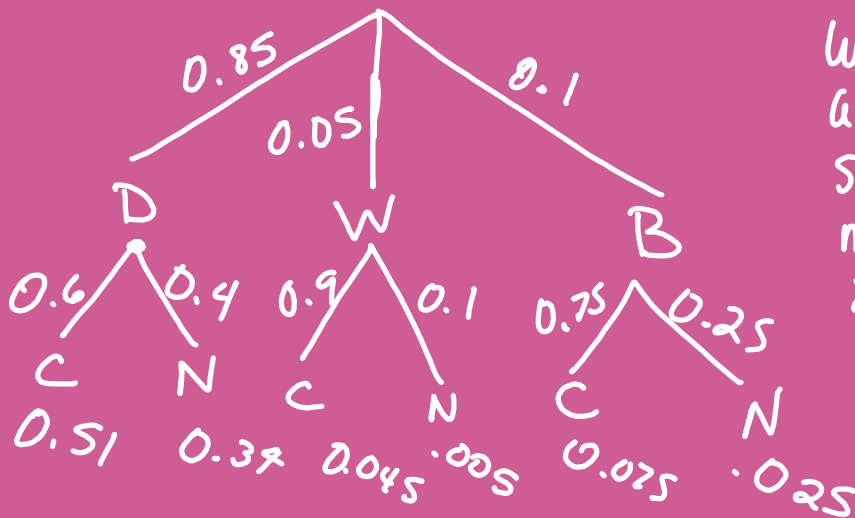$\qquad 0.51 + 0.045 + 0.075 = 0.63$

CONDITIONAL PROBABILITY — prob when there is a specific criterion about the situation

1) **If** a student wearing a **coat** is randomly selected, what is the prob he/she rode a **bus**?

Condition — If   Know — coat   prob of — bus

$$P(B \mid C) = \frac{P(BC)}{P(C)} = \frac{0.075}{0.51 + 0.045 + 0.075}$$

prob — B   Know — C   given

$$= \frac{0.075}{0.63} \approx 0.119$$

0.85
0.05
0.1

D
W
B

0.6 0.4 0.9 0.1 0.75 0.25

C   N   C   N   C   N

0.51 0.34 0.045 .005 0.075 .025

$$P(A|B) = \frac{P(AB)}{P(B)}$$

What is the prob of a student (driving) to school when someone not wearing a coat is selected?

$$P(D|N)$$

$$= \frac{P(DN)}{P(N)}$$

$$= \frac{0.34}{0.34 + 0.005 + 0.025}$$

$$= \frac{0.34}{0.37} = \frac{34}{37}$$

$$\approx 0.918$$

EXPECTED VALUE

— result of playing the game many times

— give the gain/loss per play

Pay $1 to play

yellow   Win $10

Blue   Lose $20

Green   Lose $15

White   Win $50

Expected
Value =
(prob)(gain/loss)

	yellow	blue	green	white
Prob	$\frac{3}{8}$	$\frac{2}{8} = \frac{1}{4}$	$\frac{2}{8} = \frac{1}{4}$	$\frac{1}{8}$
Gain / loss	$10-1 = 9$	$20-1 = -21$	$-15-1 = -16$	$50-1$ 49

$$= \left(\frac{3}{8}\right)(9) + \left(\frac{1}{4}\right)(-21) + \left(\frac{1}{4}\right)(-16) + \frac{1}{8}(49) = \overset{\$}{0.25}$$

Player averages
↳ 0.25 gain
per game