Election Day 2023

I took an exit poll at the November 7th election. (Not really.) For each voter, I asked these three questions:

- Y – Are you a supporter of Governor Glenn **Y**oungkin?
- D – Did you think 2021's ***D****une* was a kick-butt movie?
- B – Do you approve of Joe **B**iden's performance as President?

Each of these can be considered a random variable. Here's how often I got each of the eight possible responses:

Y	D	B	Probability
y	d	b	.04
y	d	$\neg b$	.2
y	$\neg d$	b	.06
y	$\neg d$	$\neg b$	.3
$\neg y$	d	b	.12
$\neg y$	d	$\neg b$	.04
$\neg y$	$\neg d$	b	.18
$\neg y$	$\neg d$	$\neg b$	.06

Answer the following questions:

1. How many elements should the $\mathbf{P}(Y)$ vector have? And what *is* $\mathbf{P}(Y)$?

2. How many elements should the $\mathbf{P}(D,B)$ vector have? And what *is* $\mathbf{P}(D,B)$?

3. What are the values of $\mathrm{P}(y|b)$ and $\mathrm{P}(\neg y|b)$?

4. How many elements should the $\mathbf{P}(Y|B)$ vector have? And what *is* $\mathbf{P}(Y|B)$?

5. How many elements should the $\mathbf{P}(B|D)$ vector have? And what *is* $\mathbf{P}(B|D)$?

6. Are the random variables Y and D independent?

7. Are the random variables Y and B independent?