Mathematics for Political Science

Exercise Solution 3: Probability

August 21st, 2020

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1. $36 * 35 * 5 * 12 * 13 * 6 = 5896800$
2. (a) {Reagan, Bush31, Dole, Bush43, McCain, Romney, Perot, Nader}
   (b) (graph - all the area outside of the circle around "Rational Numbers")
   (c) Whole Numbers, Natural Numbers
   (d) Natural Numbers
   (e) {1,2,3,4,5,6}
   (f) All the area around "Whole Numbers" except for the area representing "Irrational Numbers"
   (g) $\{\emptyset\}$
3. $A \cup A = A$ and $A \cap A = A$. The intersection or union of any set with itself is itself.
4.

2	$\frac{1}{16}$
3	$\frac{2}{16} = \frac{1}{8}$
4	$\frac{3}{16}$
5	$\frac{4}{16} = \frac{1}{4}$
6	$\frac{3}{16}$
7	$\frac{2}{16} = \frac{1}{8}$
8	$\frac{1}{16}$

5. (a) $\left(\frac{1}{2}\right)^6 = \frac{1}{64}$
   (b) $\binom{10}{3}\left(\frac{3}{13}\right)^3\left(\frac{10}{13}\right)^7 \approx .235$
   (c) $1 - \binom{9}{3}\binom{6}{3}\left(\frac{1}{6}\right)^9 \approx .99983$
6. (a) $.53$
   (b) $\approx .444$
   (c) $\approx .396$
   (d) $\approx .333$
   (e) $\approx .595$
7. $\frac{2}{11}$
8. (a) $\mathrm{p}(A|\mathrm{red}) = \frac{1}{7} \approx .143$, $\mathrm{p}(\mathrm{B}|\mathrm{red}) = \frac{6}{7} \approx .857$
   (b) $\mathrm{p}(A|\mathrm{blue},\mathrm{blue}) \approx .835$, $\mathrm{p}(\mathrm{B}|\mathrm{blue},\mathrm{blue}) \approx .165$
   $\mathrm{p}(A|\mathrm{blue},\mathrm{blue},\mathrm{blue}) \approx .919$, $\mathrm{p}(\mathrm{B}|\mathrm{blue},\mathrm{blue}) \approx .081$.
   (c) $\mathrm{p}(A|\mathrm{red}) = \approx .310$
9. $\frac{7}{31} \approx .226$

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