CSE 312 **(DO NOT INCLUDE YOUR NAME)**
HW #__

Problem 1 (example)

Answer:

$\mathbf{\frac{1}{4!} = \frac{1}{24} \approx 0.04167.}$

(In general, we want to see **both** a formula like $3! \cdot \binom{5}{2}$ and its explicit numerical value of 60.)

Explanation:

We need to get exactly DABC, and there are $4 \cdot 3 \cdot 2 \cdot 1 = 4!$ ways to arrange those 4 letters, so we have a $\frac{1}{24}$ probability of getting a random permutation in that order.

(**Remember to start each new problem on its own page.** Do **not** include the problem statement in your solution as it takes up too much space and we already know the problem statement.)

Problem 2 (multi-part example, and large numbers)

Part (a)

Answer:

$$\mathbf{20! \cdot \binom{13}{5} \approx 3.131 \cdot 10^{21}}$$

(Please give the raw formula you used, **and** its value, possibly in scientific notation if it is too large).

Explanation:

Explain here.

Part (b)

Answer:

answer here

Explanation:

Explain here.

Problem 3 (proof problem example)

Proof:

(Short way)

$$\begin{aligned}\mathbb{P}(E|F) &= \frac{\mathbb{P}(E \cap F)}{\mathbb{P}(F)} \text{ [def of conditional prob]} \\ &= \frac{\mathbb{P}(F|E)\mathbb{P}(E)}{\mathbb{P}(F)} \text{ [chain rule]}\end{aligned}$$

(Long way)

First, by the chain rule, we have

$$\mathbb{P}(E|F)\mathbb{P}(F) = \mathbb{P}(E \cap F)$$

Switching the roles of E and F gives

$$\mathbb{P}(F|E)\mathbb{P}(E) = \mathbb{P}(F \cap E)$$

Since $\mathbb{P}(E \cap F) = \mathbb{P}(F \cap E)$, we can set them equal to get

$$\mathbb{P}(E|F)\mathbb{P}(F) = \mathbb{P}(F|E)\mathbb{P}(E)$$

But dividing by $\mathbb{P}(F) > 0$ gives Bayes Theorem

$$\mathbb{P}(E|F) = \frac{\mathbb{P}(F|E)\mathbb{P}(E)}{\mathbb{P}(F)}$$