CSE 312 **(DO NOT INCLUDE YOUR NAME)**

HW #\_\_

**Problem 1 (example)**

**Answer:**

|  |
| --- |
| $\frac{1}{4!}=\frac{1}{24}≈0.04167$**.**  |

(In general, we want to see **both** a formula like $3!⋅\left(\genfrac{}{}{0pt}{}{5}{2}\right)$ and its explicit numerical value of $60$.)

**Explanation:**

We need to get exactly DABC, and there are $4⋅3⋅2⋅1=4!$ 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:**

|  |
| --- |
| $$20!⋅\left(\genfrac{}{}{0pt}{}{13}{5}\right)≈3.131⋅10^{21}$$ |

(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)**

$$P\left(F\right)=\frac{P\left(E∩F\right)}{P(F)} [def of conditional prob]$$

$$=\frac{P\left(E\right)P\left(E\right)}{P(F)} [chain rule]$$

**(Long way)**

First, by the chain rule, we have

$$P\left(F\right)P\left(F\right)=P(E∩F)$$

Switching the roles of $E$ and $F$ gives

$$P\left(E\right)P\left(E\right)=P(F∩E)$$

Since $P\left(E∩F\right)=P(F∩E)$, we can set them equal to get

$$P\left(F\right)P\left(F\right)=P\left(E\right)P\left(E\right)$$

But dividing by $P\left(F\right)>0$ gives Bayes Theorem

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