Bios 6301: Assignment 4

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Question 1

10 points

1. Use GitHub to turn in the first four homework assignments. Make sure the teacher (couthcommander) and TA (sarahlotspeich) are collaborators. (5 points)
2. Commit each assignment individually. This means your repository should have at least four commits. (5 points)

`The files have been pushed to my GitHub repository and shared with Sarah and Cole.`

Question 2

10 points

Use LaTeXto create the following expressions.

1. Hint: `\Rightarrow` (4 points)

Here is the equation from the prompt.

$$P(B) = \sum_j P(B|A_j)P(A_j),$$

$$\Rightarrow P(A_i|B) = \frac{P(B|A_i)P(A_i)}{\sum_j (B|A_j)P(A_j)}$$

Figure 1: equation1

Here is the equation I typeset in Latex.

```
\begin{align*}
\begin{aligned}
P(B) &=\sum_{j} P\left(B \mid A_{j}\right) P\left(A_{j}\right), \\
& \Rightarrow P\left(A_{i} \mid B\right)=
\frac{P\left(B \mid A_{i}\right)
P\left(A_{i}\right)}{\sum_{j}\left(B \mid A_{j}\right)
P\left(A_{j}\right)}
```

```
\end{aligned}
\end{align*}
```

$$P(B) = \sum_j P\left(B \mid A_j\right) P\left(A_j\right),$$
$$\Rightarrow P\left(A_i \mid B\right) = \frac{P\left(B \mid A_i\right) P\left(A_i\right)}{\sum_j \left(B \mid A_j\right) P\left(A_j\right)}$$

1. Hint: `\zeta` (3 points)

Here is the equation from the prompt.

$$\hat{f}(\zeta) = \int_{-\infty}^{\infty} f(x) e^{-2\pi i x \zeta} dx$$

Figure 2: equation2

Here is the equation I typeset in Latex.

```
\begin{align*}
\hat{f}(\zeta)=\int_{-\infty}^{\infty} f(x) e^{-2 \pi i x \zeta} d x
\end{align*}
```

$$\hat{f}(\zeta) = \int_{-\infty}^{\infty} f(x) e^{-2\pi i x \zeta} dx$$

1. Hint: `\partial` (3 points)

Here is the equation from the prompt.

$$\mathbf{J} = \frac{d\mathbf{f}}{d\mathbf{x}} = \left[\frac{\partial \mathbf{f}}{\partial x_1} \cdots \frac{\partial \mathbf{f}}{\partial x_n}\right] = \begin{bmatrix} \frac{\partial f_1}{\partial x_1} & \cdots & \frac{\partial f_1}{\partial x_n} \\ \vdots & \ddots & \vdots \\ \frac{\partial f_m}{\partial x_1} & \cdots & \frac{\partial f_m}{\partial x_n} \end{bmatrix}$$

Figure 3: equation2

Here is the equation I typeset in Latex.

```
\begin{align*}
\mathbf{J}=\frac{d \mathbf{f}}{d \mathbf{x}}=
\left[\frac{\partial \mathbf{f}}{\partial x_{1}}
\ldots \frac{\partial \mathbf{f}}{\partial x_{n}}\right] =
\left[\begin{array}{ccc}
\frac{\partial f_{1}}{\partial x_{1}} & \cdots & \frac{\partial f_{1}}{\partial x_{n}} \\
\vdots & \ddots & \vdots \\
\frac{\partial f_{m}}{\partial x_{1}} & \cdots & \frac{\partial f_{m}}{\partial x_{n}}
\end{array}\right]
\end{align*}
```

$$\mathbf{J} = \frac{d\mathbf{f}}{d\mathbf{x}} = \left[\frac{\partial \mathbf{f}}{\partial x_1} \cdots \frac{\partial \mathbf{f}}{\partial x_n}\right] = \left[\begin{array}{ccc} \frac{\partial f_1}{\partial x_1} & \cdots & \frac{\partial f_1}{\partial x_n} \\ \vdots & \ddots & \vdots \\ \frac{\partial f_m}{\partial x_1} & \cdots & \frac{\partial f_m}{\partial x_n} \end{array}\right]$$