PROBLEM-2 **ROHAN DEEPAK PASPALLU**
Topic: $B(x, y)$ **40093648**

Requirements

1. **First Requirement**
   - **ID =** FR1
   - **Type =** Functional Requirements
   - **Version =** 1.0
   - **Difficulty =** Easy
   - **Description =** The function requires two variable inputs x and y to perform the functionality on them.
   - **Rationalle =** x and y
2. **Second Requirement**
   - **ID =** FR2
   - **Type =** Functional Requirements
   - **Version =** 1.0
   - **Difficulty =** Easy
   - **Description =** The function requires the two variables to have a domain of R+ (i.e. positive real numbers).
   - **Rationalle =** $x >= 0$ and $y >= 0$
3. **Third Requirement**
   - **ID =** FR3
   - **Type =** Functional Requirements
   - **Version =** 1.0
   - **Difficulty =** Easy
   - **Description =** The output of the requirement is also in R+
   - **Rationalle =** $B(x, y) >= 0$

4. **Fourth Requirement**
   - **ID =** FR4
   - **Type =** Functional Requirements
   - **Version =** 1.0
   - **Difficulty =** Easy
   - **Description =** If the values are positive integers Z+ (including zero) the values do not have any issue. As, we can use gamma function to calculate B(x,y).
   - **Rationalle =** $\{ \forall x, y \in Z^+ \text{ |B(x,y)=}\Gamma x \Gamma y_{\overline{\Gamma(x+y)}} \}$
5. **Fifth Requirement**
   - **ID =** FR5
   - **Type =** Functional Requirements
   - **Version =** 1.0
   - **Difficulty =** Difficult
   - **Description =** But, if the values are real numbers then we have to perform integration according to the specific function which needs to be mentioned to calculate that. Here, there is a compulsion for a function to be present.
   - **Rationalle =** $\{ \forall x, y \in \text{R}^+ \text{ |B(x,y)=} \int_0^1 \frac{t^{x-1}}{(1-t)^{y-1}} dt \}$
6. **Sixth Requirement**
   - **ID =** FR6
   - **Type =** Functional Requirements
   - **Version =** 1.0
   - **Difficulty =** Easy
   - **Description =** The range of positive real variables is declared between the range of 0 to 1.
   - **Rationalle =** $\{ \forall x, y \in [0, 1] \text{ |B(x,y)=} \int_0^1 \frac{t^{x-1}}{(1-t)^{y-1}} dt \}$

7. **Seventh Requirement**
   - **ID =** FR7
   - **Type =** Functional Requirements
   - **Version =** 1.0
   - **Difficulty =** Difficult
   - **Description =** If we want to include negative values we can do that by including Image of a specific negative number.
   - **Rationalle =** $x < 0$ and $y < 0$
8. **Eighth Requirement**
   - **ID =** FR8
   - **Type =** Functional Requirements
   - **Version =** 1.0
   - **Difficulty =** Easy
   - **Description =** There should be no other inputs other than the numeric values.
   - **Rationalle =** x,y $\in$R$^+$
9. **Ninth Requirement**
   - **ID =** FR9
   - **Type =** Functional Requirements
   - **Version =** 1.0
   - **Difficulty =** Easy
   - **Description =** The two input variables can have similar as well as distinct values.
   - **Rationalle =** $x = y$ or $x \neq y$

Assumptions

1. x and y are positive real numbers x,y $\in$R$^+$
2. For x,y $\in$Z$^+$ its easier to compute $B(x, y)$
3. There is no requirement for functions to calculate $B(x, y)$.
4. There is no requirement to calculte the integral function in case of Real values of x and y.