Problem 2

1 Requirements of Beta Function

1.1 Identifier - R1

- **Identifier:** R1
- **Type:** Functional Requirements
- **Description:** The function needs two arguments p and q to evaluate function.
- **Rationale:** p and q

1.2 Identifier - R2

- **Identifier:** R2
- **Type:** Functional Requirements
- **Description:** The two variable p and q which we have defined in the R1, needs to be positive real numbers.
- **Rationale:** $p \geq 0$ and $q \geq 0$

1.3 Identifier - R3

- **Identifier:** R3
- **Type:** Functional Requirements
- **Description:** The co-domain of function is $\mathbb{R}+$.
- **Rationale:** $B(p, q) \geq 0$

1.4 Identifier - R4

- **Identifier: R4**
- **Type:** Functional Requirements
- **Description:** If the domain belongs to $\mathbb{Z}^+$, then we can evaluate beta function with the help of the Gamma function.
- **Rationale:** $\{\forall p, q \in \mathbb{Z}^+ \mid B(p, q) = \frac{\Gamma p \Gamma q}{\Gamma(p+q)}\}$[**?**]

1.5 Identifier - R5

- **Identifier: R5**
- **Type:** Functional Requirements
- **Description:** We need a supporting function to calculate the value of X raised to the power Y, if we need result of the Beta Function for positive real numbers as input. Therefore, we need to create power function $power(x, y)$ to calculate X^Y.

1.6 Identifier - R6

- **Identifier: R6**
- **Type:** Functional Requirements
- **Description:** The two variable *pandq* for beta function can be equal or cannot be equal.
- **Rationale:** $p = q$ or $p \neq q$

1.7 Identifier - R7

- **Identifier: R7**
- **Type:** Functional Requirements
- **Description:** We need a supporting function to calculate the factorial of X.

1.8 Identifier - R8

- **Identifier: R8**
- **Type:** Functional Requirements
- **Description:** We need a supporting function to calculate the natural logarithmic to find power of fractional power value.

1.9 Identifier - R9

- **Identifier: R9**
- **Type:** Functional Requirements
- **Description:** We need a supporting function to calculate the square root of X.

1.10 Identifier - R10

- **Identifier: R10**
- **Type:** Non-functional Requirements
- **Description:** The method which use to calculate the Beta Function, should be able to calculate result in efficient way for large positive inputs for p and q.

1.11 Identifier - R11

- **Identifier: R11**
- **Type:** Non-functional Requirements
- **Description:** We need a way to store large decimal values for calculating the value of Beta Function accurately.

1.12 Identifier - R12

- **Identifier: R12**
- **Type:** Non-functional Requirements
- **Description:** The method which use to calculate the Beta Function, should be able to calculate result without considering input values and hardware requirements.

1.13 Identifier - R13

- **Identifier: R13**
- **Type:** Functional Assumption
- **Description:** To calculate the value of Beta Function, we can take approximate value of the Definite Integral using Numerical Methods.