PROBLEM 1. **Jingya Pan**
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SOFTWARE ENGINEERING PROCESSES Due Date: 7/5/2019

1 Introduction

F5: $\Gamma(x)$ which is named as gamma function, is a commonly used extension of the factorial function to complex numbers

Lets define f be the Gamma Function from A to B,therefore A is the domain and B is the co-domain of the Gamma Function.

(A)Domain of function: includes all complex numbers and the positive integer.

(B)Co-domain of function:
When a in A is a positive integer, then the gamma function is related to the factorial function $\Gamma(a) = (a-1)!$
When a in A for complex numbers with a positive real part, then the $\Gamma(a) = \displaystyle\int_0^\infty x^{a-1}e^{-x}\,dx$.

2 Characteristics

(1)when $a \to 0^+, \Gamma(a) \to +\infty$

(2)Extreme property: For any real number a, a$\in \mathbf{R}$, $\lim_{n\to\infty} \frac{\Gamma(n+a)}{\Gamma(n)n^a} = 1$,

(3)Assisting computation of probability density function, $\Gamma\left(n+\frac{1}{2}\right) = \dfrac{(2n)!\sqrt{\pi}}{n!4^n}$

(4)Satisfies the recursive property: $\Gamma(a) = (a-1) * \Gamma(a-1)$

3 Special Number

$\Gamma(1) = 0! = 1$
$\Gamma(2) = 1! = 1$
$\Gamma(3) = 2! = 2$
$\Gamma(4) = 3! = 6$
Results can be worked out by Characteristics(4)—recursive property, use$\Gamma(5)$ as an example
$\Gamma(5) = 4 * Gamma(4) = 4 * 3 * Gamma(3) = 4 * 3 * 2 * 1 * Gamma(1) = 4! = 24$

4 References

[En.wikipedia.org] Gamma function https://en.wikipedia.org/wiki/Gamma function

[Course Resource] Function http://users.encs.concordia.ca/ kamthan/courses/soen-6011/functions.pdf

[Jekyll.math.byuh.edu]Properties of the Gamma function
http://www.jekyll.math.byuh.edu/courses/m321/handouts/gammaproperties.pdf