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# ETERNITY: NUMBERS - PI

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Git Repo: <https://github.com/BoyuHuo/soen6481-irrational-number>

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# Chapter 1

## User Story

Global constraint: The calculation inputs and outputs should be within the range of 15 Numbers.

### 1.1 US-1 CLEAR THE RESULT

US-1 - Clear the result	
Story ID	US-1
Priority	LOW
Description	As an user of calculator, I want to clear the previous calculation, so that I can start a new calculation from beginning
Acceptance Criteria	<ul style="list-style-type: none"><li>• User can clear the result of a calculation and start a new one</li><li>• It should not only clear the result number but also the calculator (in the middle of the calculation)</li></ul>
Estimate	1 point
Constraints	None
Acceptance Test	<ul style="list-style-type: none"><li>• GIVEN user does calculation WHEN he/she press the clean button, THEN the calculation and result should be gone.</li></ul>

## 1.2 US-2 BASIC CALCULATION

US-2 - Basic calculation	
Story ID	US-2
Priority	HIGH
Description	As an user of calculator, I want to use the basic operands so I can do the calculation such as addition, subtraction, multiplication and division
Acceptance Criteria	<ul style="list-style-type: none"> <li>• Users should able to choose the operator from + , - , * , / in his or her calculation task.</li> <li>• Users should get correct result after choose "="</li> </ul>
Estimate	3 points
Constrains	the operators cannot be appeared in a row such as 5+/*3 or 3++-5
Acceptance Test	<p>GIVEN user use calculator</p> <ul style="list-style-type: none"> <li>• WHEN he/she input 2, 3 and select "+" as operator, THEN the result should be 5.</li> <li>• WHEN he/she input 5, 3 and select "-" as operator, THEN the result should be 2.</li> <li>• WHEN he/she input 5, 3 and select "*" as operator, THEN the result should be 15.</li> <li>• WHEN he/she input 15, 3 and select "/" as operator, THEN the result should be 5.</li> </ul>

### 1.3 US-3 STORE AND RECOVER THE RESULT OR NUMBER

US-3 - Store and recover the result and number	
Story ID	US-3
Priority	MEDIUM
Description	As an user of calculator, I want to store a result or number into the memory so that I can recover it when I need it
Acceptance Criteria	<ul style="list-style-type: none"> <li>• The user should able to use the stored record as a number in the calculation</li> <li>• The original record should be erased, when the new record is saved.</li> </ul>
Estimate	2 points
Constrains	It can only store the result number not the operators
Acceptance Test	<ul style="list-style-type: none"> <li>• GIVEN user get the result of "150" WHEN he/she select "save", THEN the result "150" should be shaved in memory.</li> <li>• GIVEN user has saved a record "150" in last calculation WHEN he/she select "memo number", THEN 150 will be used in this calculation as a number.</li> </ul>

## 1.4 US-4 GET VALUE OF PI

US-4 - Get the value of PI	
Story ID	US-4
Priority	HIGH
Description	As an user of calculator, I want to get a value of PI and also able to change the Precision degree according to my requirement, so that I can use PI in my calculation.
Acceptance Criteria	<ul style="list-style-type: none"> <li>• The users should able to get 3.141592 when press the pi button</li> <li>• The users should able to use pi in any kinds calculation as a number</li> <li>• The users should able to get the pi in two different algorithms</li> <li>• The users should able to get the pi in HIGH, MEDIUM, LOW level of precision.</li> </ul>
Estimate	5 points
Constrains	the display accuracy should at least keep 5 decimal places
Acceptance Test	<ul style="list-style-type: none"> <li>• GIVEN user does the calculation WHEN he/she input pi, then the result should be 3.14159..(based on the precision degree)</li> <li>• GIVEN user configures the pi WHEN he/she select HIGH degree, THEN the pi should calculated to 3.141592653.</li> <li>• GIVEN user configures the pi WHEN he/she select MEDIUM degree, THEN the pi should calculated to 3.1415926.</li> </ul>

## 1.5 US-5 CALCULATE THE AREA OF CIRCLE

US-5 - Calculate the area of circle	
Story ID	US-5
Priority	MEDIUM
Description	As an user of calculator, I want to calculate the are of a circle just by input the r so that I can calculate the area of circle very fast
Acceptance Criteria	<ul style="list-style-type: none"> <li>• Users should able to input only r to get the area of a circle.</li> <li>• the result should be correct and precise within 15 digital numbers.</li> </ul>
Estimate	3 points
Constrains	the r must larger than 0 (since it doesn't make sense in the real life if the r is smaller than 0)
Acceptance Test	<ul style="list-style-type: none"> <li>• GIVEN the user calculates the area of a circle, WHEN he/she input the <math>r = 2</math>, THEN the result should be 12.5663704..(based on the precision degree of pi)</li> </ul>

## 1.6 US-6 CALCULATE THE CIRCUMFERENCE OF THE CIRCLE

US-6 - Calculate the circumference of the circle	
Story ID	US-6
Priority	MEDIUM
Description	As an user of calculator, I want to calculate the are of a circumference just by input the r so that I can calculate the circumference of circle very fast
Acceptance Criteria	<ul style="list-style-type: none"> <li>• Users should able to input only r to get the circumference of a circle.</li> <li>• the result should be correct and precise within 15 digital numbers.</li> </ul>
Estimate	3 points
Constrains	the r must larger than 0 (since it doesn't make sense in the real life if the r is smaller than 0)
Acceptance Test	<ul style="list-style-type: none"> <li>• GIVEN the user calculates the circumference of a circle, WHEN he/she input the <math>r = 3</math>, THEN the result should be 18.8495556..(based on the precision degree of pi)</li> </ul>



## 1.7 US-7 CALCULATE THE TRIGONOMETRIC FUNCTIONS

US-7 - Calculate the Trigonometric functions	
Story ID	US-7
Priority	LOW
Description	As an user of calculator, I want use trigonometric functions such as sine, the cosine, and the tangent, so I can do the calculation for the trigonometric problems.
Acceptance Criteria	<ul style="list-style-type: none"> <li>• The calculation should provides functions include sine, cosine and tangent, and should able to use the pi to show the angle.</li> <li>• The result should be correct and precise within 15 digital numbers.</li> </ul>
Estimate	8 points
Constrains	$\tan \pi/2$ and $\tan \pi*3/2$ does not exist.
Acceptance Test	<ul style="list-style-type: none"> <li>• GIVEN the user use the sin function, WHEN he/she inputs pi , THEN the result should be 0</li> <li>• GIVEN the user use the cosine function, WHEN he/she inputs pi , THEN the result should be -1</li> <li>• GIVEN the user use the tan function, WHEN he/she inputs <math>\pi/3</math> , THEN the result should be 1.73205080..</li> </ul>

# Chapter 2

## Backward Traceability Matrix

### 2.1 TRACEABILITY TABLE

	Interview	Use Case	Domain Model	Online Source
US-1		UC - Clear the result	DM1	
US-2		UC - Calculate the result	DM1	
US-3				Internet URL 1
US-4	Interviewee: Yanpeng Wang	UC - Use the number pi	DM1	
US-5	Interviewee: Yanpeng Wang	UC - Calculate the are of circle		
US-6	Interviewee: Yanpeng Wang			
US-7	Interviewee: Yanpeng Wang			

**Table 2.1:** Backward Traceability Matrix

- Interview (US4, US5, US6, US7): Yanpeng Wang: [D1 Report Chapter - 2](#)
- Internet URL 1 (US3) [1]: <https://www.oodeesign.com/memento-pattern-calculator-example-java-sourcecode.html>
- Domain model:DM1 (US1, US2, US4): [D1 Report Chapter - 4](#)
- Use case (US1, US2, US4, US5): [D1 Report Chapter - 5](#)

# Chapter 3

## Implementation Instruction

### 3.1 IMPLEMENTATION INSTRUCTION

User Story	Implemented
US-1	✓
US-2	✓
US-3	✓
US-4	✓
US-5	✓
US-6	✓
US-7	

**Table 3.1:** Project implementation table

Total User Story Implementation: 6 / 7

For more information about project implementation, please check the README file in the Git Repo.

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# Bibliography

- [1] oodesign author. Pi — Memento Pattern - Calculator Example, the free encyclopedia, 2019. [Online; accessed 2-August-2019].