# Answer to Problem 2
Arnab Roy, 40184043

# 1 Requirements and assumptions for Tangent function

The requirements and assumptions of the function tan(x) follow ISO/IEC/IEEE 29148 standards. A priority of 1 means most important and a priority of 5 means least important.

## 1.1 Assumptions

| Assumption ID: F2-ASSUMP1 | |
|---|---|
| **Version:** | 1.0 |
| **Type:** | Functional |
| **Owner:** | Arnab Roy |
| **Priority:** | 1 |
| **Difficulty:** | Easy |
| **Description:** | The user shall provide input in integers |
| **Rationale:** | To keep the implementation simple and generate accurate outputs with a simple algorithm |

| Assumption ID: F2-ASSUMP2 | |
|---|---|
| **Version:** | 1.0 |
| **Type:** | Functional |
| **Owner:** | Arnab Roy |
| **Priority:** | 1 |
| **Difficulty:** | Easy |
| **Description:** | The user shall provide input in range $-2^{31}$ to $2^{31}$-1 |
| **Rationale:** | The range for the `int` primitive type is from $-2^{31}$ to $2^{31}$-1 and to keep inputs small for a simple implementation |

| Assumption ID: F2-ASSUMP3 | |
|---|---|
| **Version:** | 1.0 |
| **Type:** | Non-functional |
| **Owner:** | Arnab Roy |
| **Priority:** | 3 |
| **Difficulty:** | Easy |
| **Description:** | The factorials for the calculation may be pre-stored in an array |
| **Rationale:** | To speed up the calculation of the output and execution of the algorithm |

## 1.2 Requirements

| Requirement ID: F2-REQ1 | |
|---|---|
| **Version:** | 1.0 |
| **Type:** | Functional |
| **Owner:** | Arnab Roy |
| **Priority:** | 1 |
| **Difficulty:** | Easy |
| **Description:** | When the user enters a value for which cos(x)=0, an exception shall be thrown with an useful error message |
| **Rationale:** | Tangent function does not have a valid output for angle=0 and the user shall be let known about this |

| Requirement ID: F2-REQ2 | |
|---|---|
| **Version:** | 1.0 |
| **Type:** | Functional |
| **Owner:** | Arnab Roy |
| **Priority:** | 1 |
| **Difficulty:** | Easy |
| **Description:** | If the output is -0.0, the function shall remove any signs and return 0.0 |
| **Rationale:** | Using a sign with 0 is redundant and might be confusing to the user |

| Requirement ID: F2-REQ3 | |
|---|---|
| **Version:** | 1.0 |
| **Type:** | Non-functional |
| **Owner:** | Arnab Roy |
| **Priority:** | 3 |
| **Difficulty:** | Medium |
| **Description:** | The time complexity of the program should be in $O(n)$ |
| **Rationale:** | To keep program execution fast and within 1 second |

| Requirement ID: F2-REQ4 | |
|---|---|
| **Version:** | 1.0 |
| **Type:** | Non-functional |
| **Owner:** | Arnab Roy |
| **Priority:** | 1 |
| **Difficulty:** | Hard |
| **Description:** | All angles above 90 degree shall be converted within 90 degrees |
| **Rationale:** | Calculation of smaller values is faster and all angles greater than 90 degrees can be converted within 90 degrees, so it is unnecessary to calculate higher values |

| Requirement ID: F2-REQ5 | |
|---|---|
| **Version:** | 1.0 |
| **Type:** | Functional |
| **Owner:** | Arnab Roy |
| **Priority:** | 1 |
| **Difficulty:** | Easy |
| **Description:** | The output of the function shall be a double |
| **Rationale:** | Most outputs of tangents are in decimal and removing the fractional part would make the output inaccurate |

| Requirement ID: F2-REQ6 | |
|---|---|
| **Version:** | 1.0 |
| **Type:** | Non-functional |
| **Owner:** | Arnab Roy |
| **Priority:** | 1 |
| **Difficulty:** | Medium |
| **Description:** | The output of the tangent function shall be accurate upto 6 digits after the decimal |
| **Rationale:** | Implementation of a simple algorithm has the trade-off of accuracy |

| Requirement ID: F2-REQ7 | |
|---|---|
| **Version:** | 1.0 |
| **Type:** | Non-functional |
| **Owner:** | Arnab Roy |
| **Priority:** | 1 |
| **Difficulty:** | Medium |
| **Description:** | The output shall be rounded to a value of 7 digits after the decimal |
| **Rationale:** | Since the algorithm is accurate upto 6 decimal places and sometimes 7, the output would be rounded to 7 digits after the decimal |