

Final Exam  
**TCOMP: COMPUTER APPLICATION**  
Spring 2026

**Points of attention:**

- For each question, the maximum earned points are specified in the question.
- Write clearly! Answers that are not readable are not marked and don't earn marks!
- All answers should be written in English using **blue or black pens** only.
- Use the pencil only for diagrams and graphs.
- Show all the calculation steps in the given space.
- When finished, submit the question paper, together with the answer scripts and the signed cover page to the invigilator.
- Any cheating/copying may result in an instant failing of the examination.

**Exam Duration:** 2 hours  
**Instructor's Name:** Amer Alhabsi  
**Exam Date:** 17/05/2026  
**Program:** PE

|  |           |
|--|-----------|
|  | <b>40</b> |
|  | <b>10</b> |

**Student Information**

Name:  ID:   
Signature:

**Invigilator**

Initials:  ☐ Student ID checked  
Time received:

**Question 1****[10 marks]**

Create a document using word processing software. Use **stylesheet for the title and all headings**. For *each section* add dummy text using the function **=lorem(3)**. The document must include:

- (a) The title is Separation Columns. Font for title is Arial, size 30, color dark blue, left aligned.
- (b) Main sections: Introduction, Procedure, Results and Summary. In introduction, there are two sub-sections: Background and Review. The style for the sections is (font: Impact, color: green, size 20, left-aligned) For the subsection (font: Arial, size: 18, color: red)
- (c) Add the following equation in the Introduction

$$\lim_{n \rightarrow \infty} \left(1 + \frac{1}{n}\right)^n = \sqrt{e^2}$$

- (d) Add a header on all pages with 3 sections. The left section (left-aligned) has the text TCOMP. The middle section has your name (centrally aligned) and the right section has the page number (right aligned). There must be a line below the text similar to the heading on this page.
- (e) Add a table of contents after the title but before the introduction.
- (f) Add two in-text citations in the Introduction and a bibliography at the end. Add the following references:
  - a. A book titled Process Engineering, author: Ali Salem, year of publication 2019, publisher: Amazon
  - b. A website title: Laplace Transform, author: Zoe Doe, site nu.edu.om, accessed today.

**Question 2****[10 marks]**

Download the exam spreadsheet on Blackboard under the heading Final Exam. The sheet has multiple tabs. Complete *all* the work provided in the instructions on each tab. Save the file and upload it to Blackboard.

- (a) Put your information on the tab: Student information.
- (b) On tab 2: basic functions, find the required data using Excel functions, and draw two plots as indicated on the sheet.
- (c) On the tab: pivot table, insert two pivot tables as per the instructions on the sheet.

**Question 3****[10 marks]**

The Arrhenius equation is given by

$$k = Ae^{-\frac{E}{RT}}$$

Where ***k*** is the rate, ***A*** is the frequency factor, ***E*** is the activation energy, ***R*** is a constant equal to 8.314 and ***T*** is the temperature in Kelvin.

- (a) Write a **function** in Python that calculates ***k*** given the other parameters.
- (b) Test your function by calling it with the values: ***A***=1.234, ***E***=1000 and ***T***=300.
- (c) Write another program that calls the function above. The program calculates ***k*** for ***A***=1.234, ***E***=1000 and for values of ***T***=310, 312, 314, ... 322. For each value of ***T***, display the temperature and the corresponding ***k***.

**Question 4****[10 marks]**

Let  $f(x) = \sin(x^2) + \cos(x)$  be the temperature near a chemical pipe.

Let  $g(x) = 0.9\sin(x^2) + 0.9\cos(x) - 0.6$  be the temperature 10cm away. Plot the functions  $f(x)$  and  $g(x)$  on the same figure for  $0 \leq x \leq 8$ . Include a grid and a title. Show suitable labels on both axes. Ensure your plot is smooth. Add `plt.figure(figsize=(12, 8))` at the top of your program just after the import.

**MLO and Bloom's Level of Complexity**

| Q # | MLO Addressed | Complexity Level | Mark | Remark |
|-----|---------------|------------------|------|--------|
| 1   | 1, 2          | Apply            | 10   |        |
| 2   | 1, 2, 3       | Apply            | 10   |        |
| 3   | 3, 4          | Create           | 10   |        |
| 4   | 4             | Create, Analyze  | 10   |        |

**No questions beyond this point.**

The following are commonly used statements you may or may not find useful in your exam.

```
import math
import numpy as np
import matplotlib.pyplot as plt
```

**Common Numpy functions:**

```
np.sin()
np.cos()
np.tan()
np.sqrt()
np.log()
np.log10()
np.exp()
np.pi
np.linspace()
```

**Common Matplotlib.pyplot functions**

```
plt.plot()
plt.grid()
plt.savefig()
plt.title
plt.xlabel()
plt.ylabel()
```

**Common Math functions:**

```
math.sin()
math.cos()
math.tan()
math.sqrt()
math.log()
math.log10()
math.exp()
math.pi
```