## **Fourth Programming Assignment**

Full Marks: 20

(Submission Deadline: 15th November, 2022)

1. Write a PYTHON program to compute the minimum number of denominations to provide change for a given amount of money in some currency having 1, 5, 10, 20, 25, and 50 units.

**10** 

2. Prepare the LaTeX document for the following two texts.

i)

## Hello World!

Your Name

January 1, 1831

## Getting Started

Hello World! Today I am learning IATEX. IATEX is a great program for writing math. I can write in line math such as  $a^2 + b^2 = c^2$ . I can also give equations their own space:

$$\gamma^2 + \theta^2 = \omega^2 \tag{1}$$

"Maxwell's equations" are named for James Clark Maxwell and are as follow:

$$\vec{\nabla} \cdot \vec{E} = \frac{\rho}{\epsilon_0}$$
 Gauss's Law (2)  
 $\vec{\nabla} \cdot \vec{B} = 0$  Gauss's Law for Magnetism (3)

$$\vec{\nabla} \cdot \vec{B} = 0$$
 Gauss's Law for Magnetism (3)

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$$
 Faraday's Law of Induction (4)

$$\vec{\nabla} \times \vec{B} = \mu_0 \left( \epsilon_0 \frac{\partial \vec{E}}{\partial t} + \vec{J} \right)$$
 Ampere's Circuital Law (5)

Equations 2, 3, 4, and 5 are some of the most important in Physics.

## What about Matrix Equations?

$$\begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{pmatrix} \begin{bmatrix} v_1 \\ v_2 \\ \vdots \\ v_n \end{bmatrix} = \begin{pmatrix} w_1 \\ w_2 \\ \vdots \\ w_n \end{bmatrix}$$

ii)

$$\iiint_{V} f(x, y, z) dV = F$$

$$\frac{dx}{dy} = x' = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$|x| = \begin{cases} -x, & \text{if } x < 0 \\ x, & \text{if } x \ge 0 \end{cases}$$

$$F(x) = A_0 + \sum_{n=1}^{N} \left[ A_n \cos \left( \frac{2\pi nx}{P} \right) + B_n \sin \left( \frac{2\pi nx}{P} \right) \right]$$

$$\sum_{n} \frac{1}{n^s} = \prod_{p} \frac{1}{1 - \frac{1}{p'}}$$

$$m\ddot{x} + c\dot{x} + kx = F_0 \sin(2\pi ft)$$

$$f(x) = x^2 + 3x + 5x^2 + 8 + 6x$$

$$= 6x^2 + 9x + 8$$

$$= x(6x + 9) + 8$$

$$X = \frac{F_0}{k} \frac{1}{\sqrt{(1 - r^2)^2 + (2\zeta r)^2}}$$

$$G_{\mu\nu} \equiv R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} = \frac{8\pi G}{c^4}T_{\mu\nu}$$

$$6CO_2 + 6H_2O \to C_6H_{12}O_6 + 6O_2$$

$$SO_4^{2-} + Ba^{2+} \to BaSO_4$$

$$\begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{pmatrix} \begin{pmatrix} v_1 \\ v_2 \\ \vdots \\ v_n \end{pmatrix} = \begin{pmatrix} w_1 \\ w_2 \\ \vdots \\ w_n \end{pmatrix}$$

$$\frac{\partial \mathbf{u}}{\partial t} + (\mathbf{u} \cdot \nabla)\mathbf{u} - \nu\nabla^2(\mathbf{u}) = -\nabla \mathbf{h}$$

$$\alpha A\beta B\gamma \Gamma \delta \Delta \pi \Pi \omega \Omega$$

5+5=10

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