Assignment 2 for MAT 215

Note:

- **Date of submission:** 17 December 2022 (up to 11:59 pm).
- Each question carries 12.5 marks. **Total marks: 50.** It will be finally converted to **25**.
- Don't answer other sets. Attempt the set that is instructed to do. Plagiarism and attempting other sets will lead you 0 mark.
- Please try to solve the problems by yourself.
- Please show the calculations in details for each question.
- You have to submit a scan copy of your hand written assignment.
- There should be a front page with all your details (ID, Full name etc.).
- Rename your file as: Sec_ID_Name before uploading to Google form.

SET: 1

1. Evaluate $\int_0^\infty te^{-3t}\sin 3t\,dt$. [Hint: Use the definition of Laplace transform]	[12.5]
2. Expand $f(z)=\dfrac{z}{(z-1)(2-z)};\ \lvert z-1\rvert>1.$	[12.5]
3. Evaluate the Laplace transform of $f(t)=\begin{cases}\sin t & ;\ 0\le t<\pi\\ 0 & ;\ t\ge\pi\end{cases}$.	[12.5]
4. Given that $\int_{-\pi}^{\pi}\dfrac{2a}{\left(a+\cos\theta\right)^2}d\theta\ ;\ a>1$ where $a=A+2$ and A is the last digit of your student ID. **(i)** Input a in the given integral (Example, suppose for student ID: 111223, last digit 3 is A. Therefore $a=3+2=5$). **(ii)** Now solve the integral that is obtained in **part (i)** using Cauchy's residue theorem.	[12.5]

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SET: 2

1. Evaluate $\int_0^{\infty} te^{-2t}\cos 5t\,dt$. [Hint: Use the definition of Laplace transform]	[12.5]
2. Expand $f(z)=\dfrac{1}{(z-1)(z-2)};\ 0<\lvert z-1\rvert<1.$	[12.5]
3. Evaluate the Laplace transform of $f(t)=\begin{cases} 0 & ;\ 0\le t<\pi/2 \\ \cos t & ;\ t\ge \pi/2 \end{cases}$.	[12.5]
4. Given that $\int_{-\pi}^{\pi} \dfrac{2a}{(a+\cos\theta)^2}d\theta\ ;\ a>1$ where $a=A+2$ and A is the last digit of your student ID. **(i)** Input a in the given integral (Example, suppose for student ID: 111223, last digit 3 is A. Therefore $a=3+2=5$). **(ii)** Now solve the integral that is obtained in **part (i)** using Cauchy's residue theorem.	[12.5]

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SET: 3

1. Evaluate $\int_0^{\infty} te^{2t}\sin 6t\,dt$. [Hint: Use the definition of Laplace transform]	[12.5]
2. Expand $f(z)=\dfrac{z}{(z-1)(3-z)};\ \|z-1\|>2.$	[12.5]
3. Evaluate the Laplace transform of $f(t)=\begin{cases} 2t+1 & ;\ 0\le t<1 \\ 0 & ;\ t\ge 1 \end{cases}$.	[12.5]
4. Given that $\int_{-\pi}^{\pi} \dfrac{2a}{(a+\cos\theta)^2}d\theta\ ;\ a>1$ where $a=A+2$ and A is the last digit of your student ID. **(i)** Input a in the given integral (Example, suppose for student ID: 111223, last digit 3 is A. Therefore $a=3+2=5$). **(ii)** Now solve the integral that is obtained in **part (i)** using Cauchy's residue theorem.	[12.5]