CO2013: Complex Analysis, Final, Fall 2022

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Notice:
a) Term grading policy: Exam-3×**40**%.
b) Total 125 points in this exam.
c) Exam Time: 1:00PM−3:00PM, 11 Jan., 2023.

1. (25 pts) Evaluate the integral P.V. $\displaystyle\int_{-\infty}^{\infty} \frac{\cos x + x \sin x}{x^2+1} dx$.

2. (25 pts) Evaluate the integral P.V. $\displaystyle\int_{0}^{\infty} \frac{dx}{\sqrt{x}(x^2+5x+4)}$.

3. (25 pts) Find the sum of the series $\displaystyle\sum_{k=0}^{\infty} \frac{1}{16k^2+16k+3}$ using the residue integration method.

4. (25 pts) Find the inverse Laplace transform of $F(s) = \dfrac{s+4}{s^2+6s+11}$ using the residue integration method.

5. (25 pts) (a) Find the inverse Fourier transform of $F(\omega) = \dfrac{1}{(1-i\omega)^2}$ using the residue integration method.