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American International University-Bangladesh

Faculty of Science & Information Technology

Department of Mathematics

MAT2101: Complex Variables, Laplace and Z-transformations (Sections: All)

Midterm Examination

Total Marks: 40 Time: 2 hours

**Instruction: Answer all the questions with the given conditions.**

1. Answer the following questions:
2. Evaluate ,
3. Evaluate ,
4. Evaluate , where (t) is the unit step function,
5. Evaluate
6. Evaluate .
7. Find the polar form of .
8. Find the principal argument of .
9. Answer the following questions:
10. Given, then
11. sketch and,
12. find .
13. Given, then
14. sketch ,
15. express it in terms of unit step function and,
16. find  .
17. Answer the following questions:
18. Find inverse Laplace of  .
19. Find inverse Laplace of  .
20. Solve the following differential equations using Laplace Transformations

(a)

(c)

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where, and .

1. Answerthe following questions:
2. Describe and sketch the locus represented by
3.  and (ii) .
4. Find the roots of the complex equation  and also locate them in the complex plane.
5. Let the rectangular region in *z*-plane which is bounded by the lines Determine the region of the *w*-plane into which is mapped under the transformation.