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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 **ALL** of the following questions:
2. Evaluate ,
3. Evaluate , where (t-5) is the unit step function,
4. Evaluate
5. Evaluate .
6. Find the principal argument of .
7. Answer the following questions:
8. Givenand , then
9. sketch and,
10. find .
11. Given, then
12. sketch ,
13. express it in terms of unit step function and,
14. find  .
15. Answer the following questions:
16. Find inverse Laplace of  .
17. Find inverse Laplace of  .
18. 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.