



ÇANKAYA UNIVERSITY  
Department of Mathematics

**MATH 254 - Introduction to Differential Equations**

**2. MIDTERM EXAMINATION**  
**16.12.2021**

**STUDENT NUMBER:**

**NAME-SURNAME:**

**SIGNATURE:**

**INSTRUCTOR:**

**DURATION:** 100 minutes

Question	Grade	Out of
1		20
2		20
3		20
4		20
5		20
Total		100

**IMPORTANT NOTES:**

- 1) Please make sure that you have written your student number and name above.
- 2) Check that the exam paper contains 5 problems.
- 3) Show all your work. No points will be given to correct answers without reasonable work.

1) Solve the equation  $y'' + 4y = \sec 2x$ .

2) Solve the equation  $(4x^2 + 4x + 1)y'' = 2x + 1$ , where  $2x + 1 > 0$  on a certain interval.

**3)** (a) Find the Laplace transform of  $e^{3x}\cos^3x(1 + \tan^2x)\sin x$ ,

(b) Find the inverse Laplace transform of  $\frac{s + 2}{(s + 3)^2 + 4}$ .

4) Solve the initial-value problem  $-y'' - 3xy' + 6y = 1$ ,  $y(0) = y'(0) = 0$ .

5) Solve the initial-value problem  $y'' + 2y' + y = \sin(x-2)e^{(2-x)}u(x-2)$ ,  $y(0) = 0$ ,  $y'(0) = 3$ .