

**DEPARTMENT OF MATHEMATICS
UNIVERSITY OF KANSAS
MATH 220 - SAMPLE EXAM 3**

Your Name: _____

On this exam, you may use a calculator and a list of formulas.

It is not sufficient to just write down the answers. You must explain how you arrived at your answers and how you know they are correct.

1	(40)	_____	
2	(20)	_____	
3	(40)	_____	
4	(50)	_____	
5	(50)	_____	bonus
Total	(150)	_____	

- (1) **(40 points)** Find the solution of the initial value problem using the Laplace transform.

$$\begin{cases} y'' - 2y' + 2y = 0 \\ y(0) = 1, y'(0) = 0 \end{cases}$$

- (2) **(20 points)** Find the inverse Laplace transform of the function $F(s) = \frac{(s-2)e^{-s}}{s^2-4s+3}$.

- (3) **(40 points)** Find the solution of the initial value problem using the Laplace transform.

$$\left| \begin{array}{l} y'' - y' - 2y = 0 \\ y(0) = 1, y'(0) = 1 \end{array} \right.$$

- (4) **(50 points)** Find the solution of the initial value problem and describe its behavior for increasing t . Use Laplace transform.

$$\left| \begin{array}{l} y'' + 2y' + 5y = 1 - u_{10}(t) \\ y(0) = 0, y'(0) = 0 \end{array} \right.$$

- (5) **(50 points) bonus problem** Use Laplace transform to find the solution of the initial-value problem.

$$\left| \begin{array}{l} y^{(4)} - y = u_1(t) - u_2(t) \\ y(0) = 0, y'(0) = 0, y''(0) = 0, y'''(0) = 0 \end{array} \right.$$