

**DIRECTIONS**

Provide complete legible solutions to the following problems in the space provided. Be sure to supply all the details that support your solutions

1. Use Theorems in Text to find Laplace transform of  $f$   
 $f(t) = t^2 \cos t$  Ans \_\_\_\_\_
  
2. Use two different methods to find Laplace transform of  $f$  Ans \_\_\_\_\_  
 $f(t) = te^{2t}$
  
3. Use the Laplace transform to solve the given initial-value problem. Use the table of Laplace transforms in Appendix III as needed.  
 $y'' + 9y = \cos 3t, \quad y(0) = 4, \quad y'(0) = 5$  Ans \_\_\_\_\_

3. Use the Laplace transform to solve the given initial-value problem. Use the table of Laplace transforms in Appendix III as needed.

$$y'' + y = f(t), \quad y(0) = 1, \quad y'(0) = 0, \quad \text{where } f(t) = \begin{cases} 1, & 0 \leq t < \pi/2 \\ \sin(t), & t \geq \pi/2 \end{cases}$$

4. Use Theorem 7.4.2 to evaluate the given Laplace transform. Do not evaluate the convolution integral before transforming.

$$\ell \left\{ \int_0^t \cos \tau d\tau \right\}$$

5. Solve  $f(t) = t + 1 - \frac{8}{3} \int_0^t (t - \tau)^3 f(\tau) d\tau$