

Exam 3, SM212P, March 29, 2017. Name:

SHOW WORK. No work, no credit.

NO CALCULATORS.

CIRCLE YOUR FINAL ANSWER. Problems 1-5 are 16 points each; problem 6 is 20 points.

1. a. Find $\mathcal{L}^{-1}\left\{\frac{3s+21}{s^2-2s+17}\right\}$.

2. Let $X(s) = \mathcal{L}\{\sin(3t) \star \cos(3t)\}$.

a. Find $X(s)$.

b. Use your answer to find the convolution $\sin(3t) \star \cos(3t)$.

3. Find $\mathcal{L}^{-1}\left\{240e^{-4s}\frac{1}{s^4} - 10e^{-8s}\right\}$.

4. Consider the circuit given below. Write a system of differential equations for the currents i_2 and i_3 . Do NOT solve it.

5. Consider the function f given by: $f(t) = \begin{cases} 0 & \text{for } 0 \leq t < 1 \\ 2t - 2 & \text{for } 1 \leq t < 3 \\ 0 & \text{for } 3 \leq t \end{cases}$

a. Sketch the graph of f and give a formula for it using step functions u .

b. Find $\mathcal{L}\{f\}$.

6. Apply Laplace transform to the system of differential equations given below, and use it to solve for $X(s)$ and $x(t)$.

$$x'(t) = x - 2y, \quad x(0) = -1,$$

$$y'(t) = 5x - y(t), \quad y(0) = 2.$$