

MATH 3705*
Test 1 - Solutions
January 2006

Questions 1-6 are multiple choice. Circle the correct answer. Only the answer will be marked. [12 marks]

1. $\mathcal{L}\{e^{4t} \cos(5t)\} =$
(a) $\frac{s+4}{(s+4)^2+25}$ (b) $\frac{s+4}{s^2+25}$ (c) $\frac{s-4}{(s-4)^2+25}$ (d) None of the above

2. $\mathcal{L}\{t \sin(2t)\} =$
(a) $\frac{4s}{(s^2+4)^2}$ (b) $\frac{s^2-4}{(s^2+4)^2}$ (c) $\frac{4-s^2}{(s^2+4)^2}$ (d) None of the above

3. $\mathcal{L}\left\{\int_0^t e^x \sin(t-x) dx\right\} =$
(a) $\frac{e^{-s}}{s^2+1}$ (b) $\frac{1}{(s-1)(s^2+1)}$ (c) $\frac{1}{(s-1)^2+1}$ (d) None of the above

4. $\mathcal{L}^{-1}\left\{\frac{6}{s^2-9}\right\} =$
(a) $e^{3t} - e^{-3t}$ (b) $e^{3t} + e^{-3t}$ (c) $-\sin(3t)$ (d) None of the above

5. $\mathcal{L}^{-1}\left\{\frac{3s+6}{s^2-4s+13}\right\} =$
(a) $3e^{2t} \cos(3t) + 4e^{2t} \sin(3t)$ (b) $3e^{-2t} \cos(3t) + \frac{9}{4}e^{-2t} \sin(3t)$
(c) $3e^{2t} \cos(3t) + \frac{9}{4}e^{2t} \sin(3t)$ (d) None of the above

6. $\mathcal{L}^{-1}\left\{\frac{e^{-2s}}{s^2-6s+25}\right\} =$
(a) $u(t-2)e^{3(t-2)} \sin[4(t-2)]$ (b) $\frac{1}{4}u(t-2)e^{3t-6} \sin(4t-8)$
(c) $\frac{1}{4}u(t-2)e^{3t} \sin[4(t-2)]$ (d) None of the above

7. [9 marks] Employ the Laplace transform to solve the initial-value problem

$$y'' + 2y' + 10y = 0, \quad y(0) = 1, \quad y'(0) = 2.$$

8. [9 marks] Find $f(t)$, if

$$f(t) - 2 \int_0^t f(x) dx = 2t.$$