MATH 251
Spring 2003
Exam 2
April 3, 2003

ANSWERS:

1. (a); **2.** (b); **3.** (b); **4.** (b); **5.** (d);

6. (a) $u = 6e^{-3t}\sin t$; (b) 1 rad/sec.

7. $f(t) = [u_0(t) - u_4(t)]e^{2t} + u_4(t)[t^2 - 1] = u_0(t)e^{2t} + u_4(t)[t^2 - e^{2t} - 1]$; $F(s) = \dfrac{1}{s-2} - \dfrac{e^{-4s}e^8}{s-2} + e^{-4s}\left(\dfrac{2}{s^3} + \dfrac{8}{s^2} + \dfrac{16}{s}\right) - \dfrac{e^{-4s}}{s}$.

8. $y(t) = u_3(t)e^{-(t-3)}\sin(t-3)$.

9. (a) $\overline{X}(t) = C_1\begin{pmatrix}1\\1\end{pmatrix}e^{7t} + C_2\begin{pmatrix}5\\-3\end{pmatrix}e^{-t}$; (b) $\alpha = -\dfrac{6}{5}$.

10. $\overline{X}(t) = 2e^{2t}\begin{pmatrix}\cos t - \sin t\\ \cos t\end{pmatrix} + e^{2t}\begin{pmatrix}\sin t + \cos t\\ \sin t\end{pmatrix}$.