Math 266 Summer 2016 Quiz 10

	$f(t) = \mathcal{L}^{-1}\{F(s)\}$	$F(s) = \mathcal{L}\{f(t)\}$
1.	$\cos(at)$	$\frac{s}{s^2+a^2}$
2.	$\sin at$	$\frac{a}{s^2+a^2}$

High: 20
Low: 0
(Blank Quiz)
Otherwise would have been an 8.
Average: 17

1) Find the Laplace transform of

$$f(t) = \int_0^t \sin(t-\tau)\cos(\tau)d\tau$$

$g(t) = \sin(t)$ $h(t) = \cos(t)$

$$= \frac{1}{s^2+1}\left(\frac{s}{s^2+1}\right) = \frac{s}{(s^2+1)^2}$$

2) Determine whether ① $\mathbf{x} = e^{-t}\begin{pmatrix}-1\\1\end{pmatrix} + t\begin{pmatrix}-2\\3\end{pmatrix}$ is a solution to

② $\mathbf{x}' = \begin{pmatrix}1 & 2\\3 & 2\end{pmatrix}\mathbf{x} - t\begin{pmatrix}4\\0\end{pmatrix} - \begin{pmatrix}2\\-3\end{pmatrix}$

① $x' = -e^{-t}\begin{pmatrix}-1\\1\end{pmatrix} + \begin{pmatrix}-2\\3\end{pmatrix} = \begin{pmatrix}1\\-1\end{pmatrix}e^{-t} + \begin{pmatrix}-2\\3\end{pmatrix}$

(2) $\begin{pmatrix}1 & 2\\3 & 2\end{pmatrix}\left[\begin{pmatrix}-1\\1\end{pmatrix}e^{-t} + t\begin{pmatrix}-2\\3\end{pmatrix}\right] - t\begin{pmatrix}4\\0\end{pmatrix} - \begin{pmatrix}2\\-3\end{pmatrix}$

$= \begin{pmatrix}1\\-1\end{pmatrix}e^{-t} + \begin{pmatrix}4\\0\end{pmatrix}t - \begin{pmatrix}4\\0\end{pmatrix}t - \begin{pmatrix}2\\-3\end{pmatrix} = \begin{pmatrix}1\\-1\end{pmatrix}e^{-t} + \begin{pmatrix}-2\\3\end{pmatrix}$

match, so $\vec{x}$ is a solution