Name:

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| --- | --- | --- |
| Problem | Points | Score |
| 1 | 50 |  |
| 2 | 25 |  |
| 3 | 25 |  |
| Total | 100 |  |

Notes: The exam is closed book and closed notes.

**(50 pts) Problem No. 1**: Solve this system of differential equations:

$${dx\_{1}\left(t\right)}/{dt}=\left(1\right)x\_{1}\left(t\right)+\left(2\right)x\_{2}\left(t\right)$$

$${dx\_{2}\left(t\right)}/{dt}=\left(3\right)x\_{1}\left(t\right)+\left(2\right)x\_{2}\left(t\right)$$

where $x\_{1}\left(0\right)=0$ and $x\_{2}\left(0\right)=-4$. Hint: write these equations in matrix form.

**(25 pts) Problem No. 2**: Determine whether $\{1,sin^{2}\left(x\right), cos^{2}\left(x\right)\}$ is independent in $F[0,2π]$.

**(25 pts) Problem No. 3**: Is the following matrix positive definite? $\left[\begin{matrix}2&-1&0\\-1&2&-1\\0&-1&2\end{matrix}\right]$