QUIZ 8 - MATH 310   Friday, April 2
YOUR NAME:_____   George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth around 5 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Use the cofactor method to find the inverse A^{-1} of $A = \begin{pmatrix} 2 & -3 \\ 4 & -5 \end{pmatrix}$. Please, show all steps; do not simply provide the result.

   (b) Use Gaussian elimination to find the inverse A^{-1} of $A = \begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix}$. Please show all steps; do not simply give the result.

2. The product rule for derivatives of matrix functions states that, given matrices $\boldsymbol{A}(t)$ and $\boldsymbol{B}(t)$,
$$\frac{d}{dt}(\boldsymbol{A}\boldsymbol{B}) = \frac{d\boldsymbol{A}}{dt}\boldsymbol{B} + \boldsymbol{A}\frac{d\boldsymbol{B}}{dt}. \text{ Suppose } \boldsymbol{A}(t) = \begin{pmatrix} \sin t & t \\ 1 & \cos t \end{pmatrix} \text{ and } \boldsymbol{B}(t) = \begin{pmatrix} e^{3t} & -t \\ t^2 & e^{-2t} \end{pmatrix}.$$

(a) Compute $\boldsymbol{A}\boldsymbol{B}$.

(b) Compute $\dfrac{d}{dt}(\boldsymbol{A}\boldsymbol{B})$.

(c) Compute $\dfrac{d\boldsymbol{A}}{dt}$.

(d) Compute $\dfrac{d\boldsymbol{B}}{dt}$.

(e) Compute $\dfrac{d\boldsymbol{A}}{dt}\boldsymbol{B} + \boldsymbol{A}\dfrac{d\boldsymbol{B}}{dt}$.