

Math 240 Spring 2016 Final Exam

Answers:

1. C
2. H
3. F
4. G
5. F

6.  $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$

7.  $T(1) = x^3 - 1$

$$[T]_B^C = \begin{pmatrix} -1 & 1 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -1 \\ 1 & 0 & 0 \end{pmatrix}$$

8. A) Check for basis

B)  $\frac{1}{3} \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -1 \\ -1 & 1 & 0 \end{bmatrix}$

9.  $S = \begin{bmatrix} 1 & -1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix}$  and  $D = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 3 \end{bmatrix}$

10. A)  $a = -3, a = -1$

B)  $\left\{ \begin{pmatrix} 0 \\ 1 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 2 \\ 0 \end{pmatrix}, \begin{pmatrix} 0 \\ 1 \\ 1 \\ 1 \end{pmatrix} \right\}$

11.  $y'' + 2y' + 5y = 0$

12. A

13.  $y_g = c_1 e^x + c_2 x e^x - 2x e^x + 2x e^x \ln|x|$

14.  $\mathbf{x} = e^t \begin{pmatrix} -1 \\ 1 \end{pmatrix} + 2e^t \left\{ \begin{pmatrix} 1 \\ 0 \end{pmatrix} + t \begin{pmatrix} 3 \\ -3 \end{pmatrix} \right\}$

15. (0,0) stable spiral point  
(1,1) saddle point