1) B: $\pm\frac{1}{2}\begin{vmatrix} 4 & 3 & 1 \\ -5 & 2 & 1 \\ -12 & -10 & 1 \end{vmatrix} = \pm\frac{1}{2}(101) = 50.5$

2) A: $A^{-1} = \frac{1}{-1}\begin{bmatrix} 1 & -2 \\ -4 & 7 \end{bmatrix} = \begin{bmatrix} -1 & 2 \\ 4 & -7 \end{bmatrix} = -2$

3) B: $\begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}\left(\frac{-1}{2}\right)\begin{bmatrix} 1 & -3 \\ -2 & 4 \end{bmatrix} = \left(\frac{-1}{2}\right)\begin{bmatrix} -5 & 9 \\ -6 & 10 \end{bmatrix}$

$\left(\frac{-1}{2}\right)\begin{bmatrix} -5 & 9 \\ -6 & 10 \end{bmatrix}\begin{bmatrix} 4 & 2 \\ 3 & 1 \end{bmatrix} = \left(\frac{-1}{2}\right)\begin{bmatrix} 7 & -1 \\ 6 & -2 \end{bmatrix}$

$\left(\frac{-1}{2}\right)\begin{bmatrix} 7 & -1 \\ 6 & -2 \end{bmatrix}\left(\frac{-1}{2}\right)\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix} = \left(\frac{1}{4}\right)\begin{bmatrix} 31 & -15 \\ 30 & -14 \end{bmatrix}$

4) D: (2)[2003] + (2)[2004] + (4)[2005] = [16034]

5) A: $t = \frac{D_t}{D}, \frac{\begin{vmatrix} 7 & 2 & 1 \\ 2 & 2 & 2 \\ 8 & 1 & 3 \end{vmatrix}}{\begin{vmatrix} 7 & 2 & 5 \\ 2 & 2 & 7 \\ 8 & 1 & 9 \end{vmatrix}} = \frac{34}{83}$

6) E: Expand over minors and eventually all will be multiplied by zero, therefore the answer is 0.

7) B: By definition of transpose...each row becomes new column in transposed matrix.

8) C: Infinite sum both directions: $S_1 = \frac{64}{1-.5}$, $S_2 = \frac{32}{1-.5}$, $S_1 + S_2 = 192$

9) C: -9y - 6 +20y = 16, 11y = 22, y = 2: -3x + 3 + 8y = 22, -3x + 3 + 16 = 22,
x = -1... (2) + (-1) = 1

10) B: $\left(\frac{1}{2}\right)^{10}\left(\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}\right)^{10} = \left(\frac{1}{2}\right)^{10}(2)^{10}\left(\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}\right)^{10} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

11) D: Not defined because the dimensions do not match up properly.

12) E: $D_z = \begin{vmatrix} 2 & -4 & 3 \\ 5 & 2 & 4 \\ 4 & -3 & 5 \end{vmatrix} = 11, \quad D_y = \begin{vmatrix} 2 & 3 & 3 \\ 5 & 4 & -1 \\ 4 & 5 & 2 \end{vmatrix} = 11, \quad \frac{11}{11} = 1$

13) B: $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix} = \begin{bmatrix} 4 \\ 10 \\ 16 \end{bmatrix} = 4 + 10 + 16 = 30.$

14) A: $2x^2 - 5x - 3 = 0,\ x = 3:\ y^3 = 8,\ y = 2:\ 6z^2 - 7z - 20 = 0,\ z = 2.5...\ \ x + y + z = 7.5$

15) C: $x^2 - 16 = -4:\ \ x = 2\sqrt{3}$

16) C: (Column 2) times (-4) = (Column 4), therefore (-4)(-4) = 16

17) E: $Let\ \ A(1) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix},\ \ AA = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix} = B(2),\ \ BA = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix} = C(3)$

$CA = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = D(4),\ \ DA = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} = A(1)...,$

pattern continues every 4... $\frac{2003}{4}$ *leaves a remainder of* 3 *or* $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$

18) B: By definition of $(AB)^{Transpose} = B^{Transpose} A^{Transpose}$

19) D: $w\begin{bmatrix} 1 & 0 & 0 \\ 0 & w & 0 \\ 0 & 0 & w^2 \end{bmatrix} \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ a & 0 & 0 \end{bmatrix} = \begin{bmatrix} 0 & w & 0 \\ 0 & 0 & w^2 \\ aw^3 & 0 & 0 \end{bmatrix} = X$

$\begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ a & 0 & 0 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 0 & w & 0 \\ 0 & 0 & w^2 \end{bmatrix} = \begin{bmatrix} 0 & w & 0 \\ 0 & 0 & w^2 \\ a & 0 & 0 \end{bmatrix} = Y,$ since X=Y, then $aw^3 = a,\ w = 1$

20) A: By definition: $A^{Transpose} = -A$

21) A: By definition: A singular matrix has a determinant of zero. Determinant of C is zero.

22) D: $Let\ y = x^2 - 2x + 3 : \begin{vmatrix} 2y & 4y \\ 3y & 5y \end{vmatrix} = 10y^2 - 12y^2 = -2y^2 ...$

$-2(x^2 - 2x + 3)^2 = -2(x^4 - 4x^3 + 10x^2 - 12x + 9) ... sum\ is\ -8$

23) D: $\dfrac{(12x+1)-(6+8)}{(4x+3)-(12+x)} = \dfrac{12x-13}{3x-9}$

24) A: By definition commutative property is not true

25) D: $For\ AX = B : A^{-1}AX = A^{-1}B : X = A^{-1}B\ or\ CB$

26) E: No solution: $-2\begin{bmatrix} 2 & -3 \\ 4 & -7 \end{bmatrix}\begin{bmatrix} x \\ 3 \end{bmatrix} = \begin{bmatrix} -4x+18 \\ -8x+42 \end{bmatrix} = \begin{bmatrix} 6 \\ -x \end{bmatrix}$, hence nothing will make this true.

27) C: $coefficient\begin{bmatrix} 2 & -1 & -6 \\ 1 & -9 & 0 \\ -6 & 8 & 6 \end{bmatrix}, augmented\left[\begin{array}{ccc|c} 2 & -1 & -6 & 9 \\ 1 & -9 & 0 & 13 \\ -6 & 8 & 6 & -8 \end{array}\right]$

sum in coefficient matrix is = -5, sum in augmented matrix is = 9... (-5)(9) = -45

28) C: $\left(\begin{bmatrix} -8 & 0 \\ 0 & 27 \end{bmatrix}^2\right)^3 = \begin{bmatrix} 64 & 0 \\ 0 & 729 \end{bmatrix}^3 ....n^3 = 64^3,\ n = 64$

29) B: $4^{\left(2x^2-6\right)} = 8,\ 2^{\left(4x^2-12\right)} = 2^{(3)},\ 4x^2 = 15,\ x = \dfrac{\sqrt{15}}{2} ...\ so\ (15)(2) = 30$

30) A: $D(A\begin{bmatrix} 0 & -1 \\ -1 & 2 \end{bmatrix}) = D\begin{bmatrix} 4 & -10 \\ 2 & -3 \\ 8 & -19 \end{bmatrix} = \begin{bmatrix} 16 & -39 \\ -2 & 7 \\ 4 & -7 \end{bmatrix}$ = sum = -21