Pre-Calculus Homework #16 – Answer Key

1) $\sqrt{6}+\sqrt{2}$ or $\sqrt{8+4\sqrt{3}}$

2) $\theta = 105^\circ, 345^\circ$

3) $\sqrt{4+2\sqrt{2}}$

4) $\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$

5) $\sin 2\theta = \frac{-120}{169}$ $\cos 2\theta = \frac{119}{169}$ $\tan 2\theta = \frac{-120}{119}$ quadrant IV

6) $4B+5A = \begin{bmatrix} 3 & -16 \\ -24 & -40 \end{bmatrix}$, $2A-3B = \begin{bmatrix} -31 & 35 \\ 18 & -16 \end{bmatrix}$, $AB = \begin{bmatrix} -59 & 45 \\ 48 & 0 \end{bmatrix}$, $BA = \begin{bmatrix} -35 & 100 \\ 30 & -24 \end{bmatrix}$

7) $\det A$ or $|A| = 11$, $A^{-1} = \begin{bmatrix} \frac{8}{11} & \frac{7}{11} \\ \frac{3}{11} & \frac{4}{11} \end{bmatrix}$, $\det B$ or $|B| = -60$, $B^{-1} = \begin{bmatrix} \frac{-13}{60} & \frac{1}{30} \\ \frac{-3}{20} & \frac{1}{10} \end{bmatrix}$

8) $-3B = \begin{bmatrix} -6 & 3 & 15 \\ 0 & 18 & -9 \\ -12 & -27 & 6 \end{bmatrix}$, $4A-B = \begin{bmatrix} 18 & -31 & 21 \\ 28 & -2 & -7 \\ -20 & 15 & 2 \end{bmatrix}$, $AB = \begin{bmatrix} 26 & 79 & -57 \\ 10 & -4 & -39 \\ -8 & -32 & 38 \end{bmatrix}$, $BA = \begin{bmatrix} 23 & -44 & 9 \\ -54 & 30 & 6 \\ 91 & -62 & 7 \end{bmatrix}$

9) $\det A$ or $|A| = -640$

10) $A^{-1} = \begin{bmatrix} -1 & 2 & 3 \\ 1 & -1 & -1 \\ 0 & \frac{-1}{2} & \frac{-3}{2} \end{bmatrix}$, $A^{-1}A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, $AA^{-1} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

11) $2B+5A$ is not possible, $-4A = \begin{bmatrix} 28 & -36 & 0 & 8 \\ -12 & -32 & -20 & 16 \\ 24 & -8 & 4 & -16 \end{bmatrix}$,

$$AB = \begin{bmatrix} 49 & -73 & 58 \\ -27 & -53 & 57 \\ 10 & 7 & 37 \end{bmatrix}, \qquad BA = \begin{bmatrix} 59 & -17 & 22 & -14 \\ -45 & -12 & -21 & 36 \\ 11 & -66 & -12 & 48 \\ 46 & 19 & 40 & -2 \end{bmatrix}$$

12) $\det A$ or $|A| = 186$

13) A^{-1} does not exist

14) $2B = \begin{bmatrix} 14 & -18 \\ 8 & 6 \\ -12 & 2 \\ 4 & -10 \end{bmatrix}$, $6A + B$ and AB are not possible, $BA = \begin{bmatrix} 83 & -68 & -53 & -105 & -73 \\ 23 & 10 & 43 & -3 & -1 \\ -51 & 18 & -15 & 43 & 29 \\ 31 & -34 & -37 & -47 & -33 \end{bmatrix}$

15) $\det A$ or $|A| = -123$

16) $A^{-1} = \begin{bmatrix} \frac{1}{4} & \frac{1}{4} & \frac{5}{4} & \frac{-1}{4} \\ \frac{1}{2} & \frac{5}{4} & \frac{7}{4} & -1 \\ \frac{-1}{4} & \frac{-1}{4} & \frac{-3}{4} & \frac{3}{4} \\ \frac{1}{4} & \frac{1}{2} & \frac{3}{4} & \frac{-1}{2} \end{bmatrix}$, $A^{-1}A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$, $AA^{-1} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

17) $4B + 6A = \begin{bmatrix} -30 & 52 & 22 & 10 \\ -66 & 36 & -60 & 36 \\ 8 & 6 & -40 & 22 \\ 16 & -66 & 26 & 20 \end{bmatrix}$, $3A - 2B = \begin{bmatrix} -15 & -2 & 43 & -11 \\ -9 & -18 & -18 & 18 \\ 8 & -21 & -4 & 19 \\ 28 & -21 & 5 & -10 \end{bmatrix}$

$AB = \begin{bmatrix} -28 & 58 & -10 & -43 \\ -22 & -115 & 100 & 18 \\ -3 & -52 & 19 & 41 \\ 51 & -21 & -33 & 18 \end{bmatrix}$, $BA = \begin{bmatrix} -41 & -12 & -12 & 2 \\ -39 & -15 & -114 & 45 \\ -57 & 26 & -47 & 17 \\ 80 & -71 & -14 & -3 \end{bmatrix}$

18) $\det A$ or $|A| = \frac{77}{10}$

19) $A^{-1} = \begin{bmatrix} \frac{3}{5} & \frac{22}{15} & \frac{23}{15} & \frac{1}{3} \\ \frac{-11}{5} & \frac{-83}{15} & \frac{-97}{15} & \frac{-5}{3} \\ \frac{-9}{5} & \frac{-68}{15} & \frac{-82}{15} & \frac{-5}{3} \\ -1 & \frac{-8}{3} & \frac{-10}{3} & \frac{-4}{3} \end{bmatrix}$, $A^{-1}A = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$, $AA^{-1} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

20) $8B - 3A$ is not possible, $-7A = \begin{bmatrix} -35 & 0 & 21 \\ -63 & 49 & -14 \\ 56 & -7 & -28 \\ 35 & -42 & 0 \\ -14 & 7 & 28 \end{bmatrix}$, AB is not possible, $8BA$ is not possible