Python exercises

Please don't attempt these exercises by hand. The idea is to check that you understand how to do these calculations using technology.

1. Input the matrices

$$\mathbf{A} = \begin{bmatrix} 4 & 3 & -1 \\ -7 & -5 & 9 \\ -3 & 12 & -6 \end{bmatrix} \quad \& \quad \mathbf{B} = \begin{bmatrix} -6 & 2 & 12 \\ -12 & 4 & 2 \\ -4 & -3 & -9 \end{bmatrix}.$$

   Calculate

   (a) $\mathbf{A} + \mathbf{B}$;
   (b) $54\mathbf{A} - 27\mathbf{B}$;
   (c) $\mathbf{B}^{\mathsf{T}}$;
   (d) $\mathbf{AB}$;
   (e) $\mathbf{BA}$;
   (f) $\mathbf{A}^{12}\mathbf{B}^{17}$.

2. Input the matrix

$$\mathbf{A} = \begin{bmatrix} \frac{83}{248} & \frac{86}{157} & \frac{197}{468} & \frac{5}{21} & \frac{27}{82} \\ \frac{23}{153} & \frac{191}{493} & \frac{1}{3} & \frac{97}{325} & \frac{15}{452} \\ \frac{39}{428} & \frac{169}{337} & \frac{50}{173} & \frac{50}{157} & \frac{52}{135} \\ \frac{5}{211} & \frac{1}{76} & \frac{61}{190} & \frac{176}{361} & \frac{19}{88} \\ \frac{95}{198} & \frac{120}{391} & \frac{36}{65} & \frac{3}{11} & \frac{39}{92} \end{bmatrix}.$$

   Calculate $\mathbf{A}^{23}$.