Participants of a trip:

-->   `A:matrix([1,1,1],[30,16,24],[40,24,34]);`

(%o1) $\begin{pmatrix} 1 & 1 & 1 \\ 30 & 16 & 24 \\ 40 & 24 & 34 \end{pmatrix}$

-->   `determinant(A);`

(%o2) -12

-->   `A1:matrix([45,1,1],[1116,16,24],[1542,24,34]);`

(%o4) $\begin{pmatrix} 45 & 1 & 1 \\ 1116 & 16 & 24 \\ 1542 & 24 & 34 \end{pmatrix}$

-->   `determinant(A1);`

(%o5) -264

-->   `determinant(A1)/determinant(A);`

(%o6) 22

-->   `Ab:matrix([1,1,1,45],[30,16,24,1116],[40,24,34,1542]);`

(%o9) $\begin{pmatrix} 1 & 1 & 1 & 45 \\ 30 & 16 & 24 & 1116 \\ 40 & 24 & 34 & 1542 \end{pmatrix}$

-->   `echelon(Ab);`

(%o10) $\begin{pmatrix} 1 & 1 & 1 & 45 \\ 0 & 1 & \frac{3}{7} & \frac{117}{7} \\ 0 & 0 & 1 & 11 \end{pmatrix}$

-->   `solve([x+y+z=45,30*x+16*y+24*z=1116,40*x+24*y+34*z=1542]);`

(%o12) $[[z = 11, y = 12, x = 22]]$

Savings

(%i37) `M:matrix([1,1/2],[1/2,1]);`

1

(%o37) $\begin{pmatrix} 1 & \frac{1}{2} \\ \frac{1}{2} & 1 \end{pmatrix}$

(%i5) `V:matrix([10],[20]);`

(%o5) $\begin{pmatrix} 10 \\ 20 \end{pmatrix}$

(%i69) `M^^11;`

(%o69) $\begin{pmatrix} \frac{44287}{1024} & \frac{88573}{2048} \\ \frac{88573}{2048} & \frac{44287}{1024} \end{pmatrix}$

(%i70) `(M^^11).V;`

(%o70) $\begin{pmatrix} \frac{166075}{128} \\ \frac{1328605}{1024} \end{pmatrix}$

(%i71) `float((M^^11).V);`

(%o71) $\begin{pmatrix} 1297.4609375 \\ 1297.4658203125 \end{pmatrix}$

(%i44) `N:matrix([0,0],[0,0]);`

(%o44) $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$

(%i45) `for i:1 thru 11 step 1 do N:N+M^^i;`

(%o45) *done*

(%i46) `N;`

(%o46) $\begin{pmatrix} \frac{32959}{256} & \frac{261625}{2048} \\ \frac{261625}{2048} & \frac{32959}{256} \end{pmatrix}$

(%i61) `r:N.V;float(r);`

(%o61) $\begin{pmatrix} \frac{1967305}{512} \\ \frac{3944845}{1024} \end{pmatrix}$

(%o62) $\begin{pmatrix} 3842.392578125 \\ 3852.3876953125 \end{pmatrix}$

(%i65) `r[1,1]+r[2,1];float(r[1,1]+r[2,1]);`

(%o65) $\dfrac{7879455}{1024}$

(%o66) 7694.7802734375

(%i68) eigenvectors(M);

(%o68) $[[[\frac{3}{2}, \frac{1}{2}], [1, 1]], [[[1, 1]], [[1, -1]]]]$

(%i73) float(15*(3/2)^11-5*(1/2)^11);

(%o73) 1297.4609375

(%i74) float(15*(1/2)^11+5*(3/2)^11);

(%o74) 432.4951171875

(%i77) float(15*(3/2)^11*matrix([1],[1])-5*(1/2)^11*matrix([1],[11]));

(%o77) $\begin{pmatrix} 1297.4609375 \\ 1297.4365234375 \end{pmatrix}$

Pond

(%i80) P:matrix([0,3,3],[0.2,0,0],[0,0.6,x]);

(%o80) $\begin{pmatrix} 0 & 3 & 3 \\ 0.2 & 0 & 0 \\ 0 & 0.6 & x \end{pmatrix}$

(%i81) Plam:matrix([-l,3,3],[0.2,-l,0],[0,0.6,x-l]);

(%o81) $\begin{pmatrix} -l & 3 & 3 \\ 0.2 & -l & 0 \\ 0 & 0.6 & x-l \end{pmatrix}$

(%i85) eq:determinant(Plam);

(%o85) $l^2 \cdot (x - l) - 0.6000000000000001 \cdot (x - l) + 0.36$

(%i88) eq2:subst([l=1],eq);

(%o88) $x - 0.6000000000000001 \cdot (x - 1) - 0.64$

(%i89) solve(eq2);

rat: replaced -0.64 by -16/25 = -0.64
rat: replaced -0.6000000000000001 by -3/5 = -0.6

(%o89) $[x = \dfrac{1}{10}]$

(%i90) `eigenvalues(P);`

rat: replaced 0.36 by 9/25 = 0.36
rat: replaced -0.6000000000000001 by -3/5 = -0.6

$$(\%o90)\ \left[\left[\left(-\frac{\sqrt{3}\cdot i}{2}-\frac{1}{2}\right)\cdot\left(\frac{\sqrt{-500\cdot x^4+300\cdot x^3+600\cdot x^2-1620\cdot x+549}}{150}+\frac{50\cdot x^3-270\cdot x+243}{1350}\right)^{\frac{1}{3}}+\right.\right.$$

$$\frac{\left(\frac{\sqrt{3}\cdot i}{2}-\frac{1}{2}\right)\cdot\left(5\cdot x^2+9\right)}{45\cdot\left(\frac{\sqrt{-500\cdot x^4+300\cdot x^3+600\cdot x^2-1620\cdot x+549}}{150}+\frac{50\cdot x^3-270\cdot x+243}{1350}\right)^{\frac{1}{3}}}+\frac{x}{3},\left(\frac{\sqrt{3}\cdot i}{2}-\frac{1}{2}\right)\cdot$$

$$\left(\frac{\sqrt{-500\cdot x^4+300\cdot x^3+600\cdot x^2-1620\cdot x+549}}{150}+\frac{50\cdot x^3-270\cdot x+243}{1350}\right)^{\frac{1}{3}}+$$

$$\frac{\left(-\frac{\sqrt{3}\cdot i}{2}-\frac{1}{2}\right)\cdot\left(5\cdot x^2+9\right)}{45\cdot\left(\frac{\sqrt{-500\cdot x^4+300\cdot x^3+600\cdot x^2-1620\cdot x+549}}{150}+\frac{50\cdot x^3-270\cdot x+243}{1350}\right)^{\frac{1}{3}}}+\frac{x}{3},\left(\frac{\sqrt{-500\cdot x^4+300\cdot x^3+600\cdot x^2-1620\cdot x+}}{150}\right.$$

$$\frac{5\cdot x^2+9}{45\cdot\left(\frac{\sqrt{-500\cdot x^4+300\cdot x^3+600\cdot x^2-1620\cdot x+549}}{150}+\frac{50\cdot x^3-270\cdot x+243}{1350}\right)^{\frac{1}{3}}}+\frac{x}{3}\right],[1,1,1]\right]$$