

```

n = 10;
Print[{
  MatrixForm[A = Array[
    If[#1 == #2, 0, Random[Integer, {0, 1}]] &,
    {n, n}
  ]],
  v = Table[2 * Random[Integer, {0, 1}] - 1, {n}],
  MatrixForm[BB = (X^v - 1) * A],
  Det[IdentityMatrix[n] - BB] // Together // ExpandDenominator // ExpandNumerator,
  MatrixForm[CC = v * A + DiagonalMatrix[v]],
  Z = Tr[Inverse[IdentityMatrix[n] - BB].BB.CC] // Together //
  ExpandDenominator // ExpandNumerator,
  Exp[-Integrate[Z/X, X]] // Together // ExpandDenominator // ExpandNumerator
}]

```

$$\left\{ \begin{pmatrix} 0 & 0 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 & 1 & 0 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 & 1 & 0 & 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 0 & 1 & 0 & 0 & 1 & 1 & 0 \end{pmatrix}, \{-1, 1, -1, 1, -1, -1, -1, -1, -1, 1\},$$

$$\left(\begin{array}{cccccccccc} 0 & 0 & -1 + \frac{1}{x} & -1 + \frac{1}{x} & -1 + \frac{1}{x} & 0 & -1 + \frac{1}{x} & -1 + \frac{1}{x} & -1 + \frac{1}{x} & 0 \\ 0 & 0 & 0 & -1 + X & -1 + X & 0 & -1 + X & -1 + X & 0 & -1 + X \\ 0 & 0 & 0 & -1 + \frac{1}{x} & -1 + \frac{1}{x} & -1 + \frac{1}{x} & -1 + \frac{1}{x} & 0 & 0 & -1 + \frac{1}{x} \\ 0 & -1 + X & 0 & 0 & 0 & -1 + X & -1 + X & 0 & 0 & 0 \\ 0 & 0 & -1 + \frac{1}{x} & 0 & 0 & -1 + \frac{1}{x} & 0 & 0 & -1 + \frac{1}{x} & -1 + \frac{1}{x} \\ -1 + \frac{1}{x} & -1 + \frac{1}{x} & 0 & -1 + \frac{1}{x} & -1 + \frac{1}{x} & 0 & -1 + \frac{1}{x} & 0 & 0 & 0 \\ -1 + \frac{1}{x} & 0 & -1 + \frac{1}{x} & 0 & -1 + \frac{1}{x} & 0 & 0 & 0 & 0 & 0 \\ -1 + \frac{1}{x} & 0 & -1 + \frac{1}{x} & 0 & -1 + \frac{1}{x} & -1 + \frac{1}{x} & 0 & 0 & -1 + \frac{1}{x} & 0 \\ -1 + \frac{1}{x} & -1 + \frac{1}{x} & 0 & -1 + \frac{1}{x} & -1 + \frac{1}{x} & 0 & 0 & 0 & 0 & -1 + \frac{1}{x} \\ -1 + X & -1 + X & -1 + X & 0 & -1 + X & 0 & 0 & -1 + X & -1 + X & 0 \end{array} \right),$$

$$\frac{-1 + 3 X + 3 X^2 - 17 X^3 + 17 X^4 - 27 X^5 + 93 X^6 - 157 X^7 + 136 X^8 - 59 X^9 + 10 X^{10}}{x^7},$$

$$\left(\begin{array}{cccccccc} -1 & 0 & -1 & -1 & -1 & 0 & -1 & -1 & -1 & 0 \\ 0 & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & -1 & -1 & -1 & -1 & -1 & 0 & 0 & -1 \\ 0 & 1 & 0 & 1 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & -1 & -1 & 0 & 0 & -1 & -1 \\ -1 & -1 & 0 & -1 & -1 & -1 & -1 & 0 & 0 & 0 \\ -1 & 0 & -1 & 0 & -1 & 0 & -1 & 0 & 0 & 0 \\ -1 & 0 & -1 & 0 & -1 & -1 & 0 & -1 & -1 & 0 \\ -1 & -1 & 0 & -1 & -1 & 0 & 0 & 0 & -1 & -1 \\ 1 & 1 & 1 & 0 & 1 & 0 & 0 & 1 & 1 & 1 \end{array} \right),$$

$$\frac{-7 + 18 X + 15 X^2 - 68 X^3 + 51 X^4 - 54 X^5 + 93 X^6 - 136 X^8 + 118 X^9 - 30 X^{10}}{-1 + 3 X + 3 X^2 - 17 X^3 + 17 X^4 - 27 X^5 + 93 X^6 - 157 X^7 + 136 X^8 - 59 X^9 + 10 X^{10}} \cdot \frac{-1 + 3 X + 3 X^2 - 17 X^3 + 17 X^4 - 27 X^5 + 93 X^6 - 157 X^7 + 136 X^8 - 59 X^9 + 10 X^{10}}{x^7}$$

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wAlex[GC[Ar[1, 3, +1], Ar[2, 5, -1], Ar[6, 4, +1]]/x // Together // ExpandDenominator //
ExpandNumerator
```

$$\left\{ \frac{2 - 2 X}{-2 + X} \right\}$$

```

n = 3;
Print[{{
  A =  $\begin{pmatrix} 0 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{pmatrix}$ ,
  v = {-1, 1, 1},
  MatrixForm[BB = (X^v - 1) * A],
  MatrixForm[CC = v * A + DiagonalMatrix[v]],
  Tr[Inverse[IdentityMatrix[n] - BB].BB.CC] // Together // ExpandDenominator //
  ExpandNumerator
}}]

```

```

{{{0, 0, 0}, {1, 0, 1}, {0, 1, 0}}, {-1, 1, 1},  $\begin{pmatrix} 0 & 0 & 0 \\ -1 + X & 0 & -1 + X \\ 0 & -1 + X & 0 \end{pmatrix}$ ,  $\begin{pmatrix} -1 & 0 & 0 \\ 1 & 1 & 1 \\ 0 & 1 & 1 \end{pmatrix}$ ,  $\frac{2 - 2X}{-2 + X}$ }

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Exp[-Integrate[ $\left(\frac{2 - 2X}{-2 + X}\right) / X, X]$ ] // Simplify

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(-2 + X) X

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