```
> #Q1
> P:=Matrix(5,5,[0,0,0,1,0,0,0,0,0,1,0,0,0,0,1,0,1,0,0,0,2/5,0,
  3/5,0,0]):
> with(LinearAlgebra):
> T := DeleteRow( DeleteColumn( P, 3), 3) :
> (MatrixInverse(1 − T).Vector(4, 1))[1]; # part a)
```

$$\frac{20}{3} \tag{1}$$

```
> s:=LinearSolve(Transpose(1-P),Vector(5)):
> s[3] / add(s[i], i = 1..5); # part b)
```

$$\frac{3}{14} \tag{2}$$

```
> #Q2
> P := Matrix(7, 7, [0, 1/4, 0, 1/4, 1/4, 1/4, 0, 1/4, 0, 0, 1/4, 0, 1/4, 1/4, 0, 0, 0, 1, 0, 0, 0, 1/4, 1/4,
      1/4, 0, 0, 0, 1/4, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 1]) :
> (P[[1..4], [1..4]]^5. Vector(4, 1))[3]; # part a)
```

$$\frac{29}{128} \tag{3}$$

```
> (MatrixInverse(1 − P[[1..4], [1..4]]).P[[1..4], [5..7]])[3, 1]; # part b)
```

$$\frac{1}{7} \tag{4}$$

```
> #Q3
> P := Matrix(4, 4, [0, 0, 0, 1, 0, 0, 1, 0, 3/7, 0, 0, 4/7, 0, 1/3, 2/3, 0]) :
> s := LinearSolve(Transpose(1-P), Vector(4)) :
> s[2] / add(s[i], i = 1..4); # part a)
```

$$\frac{7}{58} \tag{5}$$

```
> (MatrixInverse(1 − P[[3, 4], [3, 4]]).P[[3, 4], [1, 2]])[1, 1]; # part b)
```

$$\frac{9}{13} \tag{6}$$

```
> #Q4
> P := Matrix(4, 4, [1, 0, 0, 0, 0, 0, 1/2, 1/2, 1/2, 1/2, 0, 0, 0, 0, 1/2, 1/2]) :
> 2 + Transpose(Vector(1/4, 3)). MatrixInverse(1 − P[[2..4], [2..4]]).Vector(3, 1);
```

$$6 \tag{7}$$

```
> #Q5
> P := Matrix(6, 6, [0, 1/2, 1/2, 0, 0, 0, 1/2, 0, 0, 1/2, 0, 0, 1/4, 0, 0, 1/4, 1/4, 1/4, 0, 1/3, 1/3, 0, 1/3,
```

$$0, 0, 0, \frac{1}{2}, \frac{1}{2}, 0, 0, 0, 0, 1, 0, 0, 0\Big]\Big) :$$

```
> Q := P^3 : Q[1, 5];   # part a)
```

$$\frac{1}{8} \quad \textbf{(8)}$$

```
> s := LinearSolve(1 - Transpose(P), Vector(6)) :
> s[5] / add(s[i], i = 1..6);    # part b)
```

$$\frac{1}{7} \quad \textbf{(9)}$$

```
>
```