Recall: \[ \sum_{n=0}^{\infty} r^n = 1/(1-r) \text{ for } |r|<1. \] Thus \[ \sum_{n=1}^{\infty} r^n = \frac{1}{1-r} - r^0 = \frac{1}{1-r} - 1 = \frac{1-r}{1-r} - \frac{r}{1-r} = \frac{1}{1-r}. \]

Let \(X_0, X_1, X_2, \ldots\) be a sequence of discrete identical independently distributed discrete random variables and the mass function is \(\frac{1}{2}\) at -1 and \(\frac{1}{4}\) at 1 and 2.

**Ans. sum=5/2**

(a) What is the mass function at 3?

(b) Find \(E(X_n)\).

(c) Find \(E[\sum_{n=1}^{\infty} (.9)^n X_n]\). Justify your calculation.

---

### 271.1 (5 points)

A traveling salesman is always in one of four regions: region 1, 2, 3, or 4. If he is in 1 this week, next week he will be in region 2 with probability 3/7 or region 4 with probability 4/7. If he is in 2, next week he will be in one of the other three regions with equal probability. If he is in 3, next week he will be in one of the 2 or 4 with equal probability. If he is in region 4, next week he will be in region 1 with certainty.

(a) Find the transition matrix. Row sums must be 1.

(b) Draw the transition diagram.

#### Transition Matrix

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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<td>1/4</td>
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</tr>
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</tr>
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<td>0</td>
<td>1/2</td>
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<td>0</td>
</tr>
</tbody>
</table>

#### Transition Diagram

![Transition Diagram](image.png)

Calculate the probability \(P[X_3 = 1|X_0 = 1]\). 6 symbols checksum 28.