Quiz 4

Name: Student ID:

1. **Markov chain transitions**.

$$\mathbf{P} = [\mathbf{P}_{ij}] = \begin{bmatrix} 0.5 & 0.25 & 0.25 \\ 0.25 & 0.5 & 0.25 \\ 0.25 & 0.25 & 0.5 \end{bmatrix} \tag{1}$$

Let X_1 be uniformly distributed over the states $\{0, 1, 2\}$. Let $\{X_\ell\}_1^\infty$ be a Markov chain with transition matrix $\mathbf{P}$, thus $\Pr[X_{n+1} = j | X_n = i] = \mathbf{P}_{ij}$, $i, j \in \{0, 1, 2\}$.

(a) Is $\{X_n\}$ stationary? Why?

(b) Find $\lim_{n\to\infty} \frac{1}{n} H(X_1, X_2, \ldots, X_n)$.