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Problem 3: Three tosses of a fair coin

(4/4 points)

You flip a fair coin (i.e., the probability of obtaining Heads is $1/2$) three times. Assume that all sequences of coin flip results, of length 3, are equally likely. Determine the probability of each of the following events.

1. $\{HHH\}$: 3 Heads

   | 0.125 | ✔   **Answer:** 0.125

2. $\{HTH\}$: the sequence Heads, Tails, Heads

   | 0.125 | ✔   **Answer:** 0.125

3. Any sequence with 2 Heads and 1 Tails (in any order):

   | 0.375 | ✔   **Answer:** 0.375

4. Any sequence in which the number of Heads is greater than or equal to the number of Tails:

| 0.5 |

✔ **Answer:** 0.5

Answer:
Since all outcomes are equally likely, we are dealing with a discrete uniform probability law. To obtain the probability of an event, we simply count the number of elements in the event and divide by the total number of elements in the sample space.

There are 3 flips, with 2 possible results for each flip. Thus there are $2^3 = 8$ elements (distinct sequences) in the sample space.

1. Any particular sequence has probability $1/8$. Therefore, $\mathbf{P}(\{HHH\}) = \boxed{1/8}$.

2. This event again consists of a single sequence, and so $\mathbf{P}(\{HTH\}) = \boxed{1/8}$.

3. The event of interest is $\{HHT, HTH, THH\}$. Since it consists of 3 elements, its probability is $\boxed{3/8}$.

4. The set of sequences that have at least as many Heads as Tails is $\{HHH, HHT, HTH, THH\}$. Its probability is $\boxed{4/8}$.

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