p4_tracking_q4_approximate_inference_observation

Question 4 (3 points): Approximate Inference Observation

Approximate inference is very trendy among ghost hunters this season. Next, you will implement a particle filtering algorithm for tracking a single ghost.

Implement the functions `initializeUniformly`, `getBeliefDistribution`, and `observe` for the `ParticleFilter` class in `inference.py`. A correct implementation should also handle two special cases. (1) When all your particles receive zero weight based on the evidence, you should resample all particles from the prior to recover. (2) When a ghost is eaten, you should update all particles to place that ghost in its prison cell, as described in the comments of `observe`. When complete, you should be able to track ghosts nearly as effectively as with exact inference.

To run the autograder for this question and visualize the output:

```
python autograder.py -q q4
```

Hints:

- A particle (sample) is a ghost position in this inference problem.
- The belief cloud generated by a particle filter will look noisy compared to the one for exact inference.
- `util.sample` or `util.nSample` will help you obtain samples from a distribution. If you use `util.sample` and your implementation is timing out, try using `util.nSample`.