Part6:

Null Hypothesis: H0: Repeated Forward A\* = Adaptive A\*: Meaning there is no systematic difference between the two algorithms

Alternate Hypothesis: H1: There is systematic difference. (inverse of the Null Hypothesis)

Steps for statistical hypothesis test

1. Under the null hypothesis, the test assumes that two samples were drawn from the same experiment setup (population), meaning identical grid with same start and target.
2. Run experiments and record results. compute respective sample mean and sample standard deviation. Let delta (D) be the difference in their means.
3. One can choose either two sample z test (Reference) (for large sample size) or two sample t test (for small sample size) to test the significance of the difference between the two samples.
4. Find the distribution of Δ under the assumption that the null hypothesis is true,

Forward A\* = Adaptive A\*

1. Use this distribution to find the probability p of Δ, assuming Forward A\* = Adaptive A\*
2. If the probability is very low (if p <.01), meaning 99% confidence,

reject null Hypothesis H0: Forward A\* = Adaptive A\*

(p value is the probability of incorrectly rejecting H0)

1. p<.01 is the residual uncertainty that Forward A\* *might* equal Adaptive A\*

If experimental setup (population) standard deviation is unknown and samples are small, we can use the t test.

In this case we assume the sampling distribution to be t, not normal, but approaches normal as samples size increases. The test statistic has very similar form as normal, but probabilities of the test statistic are obtained by consulting tables of the t distribution, not the standard normal distribution.

Weighted average of the two sample standard deviations}

The Z test (Reference) involves nothing more than standardizing the difference between m, the mean of the sampling distribution under the null hypothesis and the sample mean .

Bibliography: Paul Cohen, Empirical Methods for Artificial Intelligence, USC Information Sciences Institute <http://www.eecs.harvard.edu/cs286r/courses/spring08/reading6/CohenTutorial.pdf>