Purpose: To develop and validate a class solution for inverse planning simulated annealing (IPSA) with CT based prostate high dose rate brachytherapy (HDR). Method and Materials: Between November 2008 and November 2011, our institution treated 40 prostate cancer patients with HDR in 7 Gy fractions followed by external beam radiotherapy. The HDR treatments were planned with Nucletron Oncentra using manual graphical optimization (GO). Plans were optimized to the following clinical goals: ≥ 95% of prostate volume received 7 Gy, < 1 cc of rectum received 5.6 Gy, < 0.1 cc of rectum received 6.3 Gy, and < 0.01 cc of urethra received 8.75 Gy. New plans were manually customized using IPSA (MC-IPSA) for each patient to match prostate coverage of 7 Gy to within ± 1% of the GO plans while meeting the rectal and urethral dose constraints. An IPSA class solution (CS-IPSA) was created from the mean MC-IPSA parameters. New plans were developed for each patient using only CS-IPSA with no further optimization. Results: Plans were optimized in about 30 minutes using GO, MC-IPSA took an average of 14.1 ± 6.5 minutes, and CS-IPSA optimization was < 1 minute. The mean prostate dose heterogeneity, $V_{14\text{ Gy}}$ and $V_{10.5\text{ Gy}}$, was improved with both IPSA methods ($p << 0.05$) vs. GO. There was no significant difference ($p > 0.05$) among the optimization methods for all other clinical goals. Conclusion: The developed IPSA class solution yields prostate HDR plans comparable to custom manual IPSA and graphical optimization while saving considerable time.