MAD 4401 ASSIGNMENT

JAMES KEESLING

Work the following problems. This is for extra credit. The problems also help prepare for Test 2. Use the class periods on April 8 and 10 to work together on the problems. Each person should turn in the assignment individually on Monday 4/13/15.

Problem 1. There are three urns, I, II, and III. Each urn has white balls and black balls. Urn I has 3W and 4B, Urn II has 7W and 1B. Urn III has 2W and 6B. An urn is chosen at random and a ball is chosen at random out of the urn. What is the probability that Urn II was chosen given that the ball was black?

Problem 2. Suppose that a certain bowler will produce a strike with probability .85, a spare with probability .10, and have an open frame with probability .05. Using the **bowling** program to estimate the probability that such a bowler will bowl 200 or greater in a game.

Problem 3. Consider the differential equation $\frac{dx}{dt} = t^2 \cdot x$ with initial condition $x(0) = 2$. Solve this differential equation numerically on $[0, 1]$ using the Euler and Runge Kutta methods with $h = 1/10$ and $n = 10$. Give the estimated values of the points to eight digits.

Problem 4. Determine the Taylor expansion for the solution of the differential equation $\frac{dx}{dt} = t^2 \cdot x$ with $x(0) = 1$. Determine the expansion to the t^10 term, $x(t) \approx a_0 + a_1 \cdot t + a_2 \cdot t^2 + a_3 \cdot t^3 + a_4 \cdot t^4 + a_5 \cdot t^5 + a_6 \cdot t^6 + a_7 \cdot t^7 + a_8 \cdot t^8 + a_9 \cdot t^9 + a_{10} \cdot t^{10}$.

Problem 5. Derive the steady-state probabilities for a single server queue M/M/∞/FIFO with service rate σ and arrival rate α.