Midterm 3 / 2014.4.25 / CS 3333.001 / Mathematical foundations of computer science

Name: _____

Please show all work and justify your answers.

1. How many ways can the 9 Supreme Court justices seat themselves behind the bench so that none of the 3 women on the court sit next to one another. What if they later adjourn to socialize at a round table? What if the first couple joins them and they don't want to sit next to each other either?

   Hint: $P(r,k) = \dfrac{r!}{(r-k)!}$.

2. What's more likely, rolling a 7 with 4 dice or 5 with 3?

   Hint: k-combinations out of n with repeats: $C(n+k-1, k)$, where $C(r,k) = P(r,k)/k!$.

3. Suppose 65% of email you receive is spam, 1% of legitimate email contains the words "hair loss" and 20% of spam messages contain those words. If you receive a message containing those words, what's the probability that it's spam?

   Hint: Bayes Theorem for two events in a sample space: $p(F|E) = \dfrac{p(E|F)p(F)}{p(E|F)p(F) + p(E|\overline{F})p(\overline{F})}$.

4. Express the probability of being within ± 2 of the mean in terms of the error function, if the probability density is normal with mean 10 and standard deviation 3.

1	2	3	4	total (40)	%

Prelim. course grade: %