Honors Pre-Calculus & Trigonometry   Name:_____

Probability, Counting, and Binomial Theorem Test   Friday, November 4, 2011

Instructions: **Show at least one step on each problem except 1f**. *Work out the values on your calculator unless otherwise noted, and round all answers to FOUR decimal places.* Good luck and have fun!

1. Evaluate each of the following. 2 points each.

a. $\binom{6}{4}$	b. P(6,4)	c. $_5C_2$
d. $_3P_3$	e. 4!	f. 0!

2. (2 points) Justin Bieber's Ferrari 458 has a Canadian license plate (his birthplace is Stratford, Ontario, in case you didn't know). License plates in Ontario have the format of ABCD-123. Assuming Justin has to have a commoners' license plate (not a specialized one), how many different license plates are possible if characters are allowed to be repeated?

3. (2 points) Oh, baby, Justin Bieber is going to play the "Beano" game! Explain to him where he should place his 12 beans in order to win. Be sure to cite probability in your explanation!

4. (4 points) Seven couples have reserved seats in a row for Waynesville's playoff game where it is rumored that Justin Bieber will sing the National Anthem. In how many different ways can they be seated if

        (a) there are no seating restrictions?

        (b) the two members of each couple wish to sit together?

5. (2 points) In how many ways can you arrange the letters in the word BIEBER?

6. (4 points) Justin Bieber invents a new card game in which seven cards are dealt to each person. A "Screaming Bieber" is defined to be the scenario in which you have exactly three pairs. What is the probability that you are dealt a Screaming Bieber? (Example of Screaming Bieber: A-A-8-8-J-J-9)

7. (4 points) What is the 6th term in the expansion of $(3 + i)^{14}$ Remember, $i = \sqrt{-1}$, so simplify!!!

9. (4 points) Factor: $x^{15} - 15x^{12}y^2 + 90x^9y^4 - 270x^6y^6 + 405x^3y^8 - 243y^{10}$

10. (7 points) There are 12 songs on Justin Bieber's "My World 2.0" album. Pattie, his mom, loves four of these songs (they're her favorites), but she only "sort of" likes the other 8. How many ways are there for her to select five of these songs for a playlist if she wants

(a) all five songs to be favorites

(b) none of the songs to be favorites (okay, I know you wouldn't make a playlist like this, but it's a math test, so cut me some slack!)

(c) two of the songs to be favorites

(d) at least 3 songs to be favorites

12. (4 points) In a moment of insanity, Mrs. Rivero decides to listen to the song "Baby." After listening to the song, she answers 12 math questions. Normally, her probability of getting a question correct is 100%; however, as we are all aware, the song reduced her cognitive abilities and thus, her probability of getting a question correct is now 70%. What is the probability that she scores at least a 75% on this test?

1.   Happy Birthday!

There are 30 people in a room ... what is the chance that any two of them celebrate their birthday on the same day? Assume 365 days in a year.

2. Justin Bieber is sitting in his studio writing a song. He is stuck on the first line... "Baby" so he stares out the window for inspiration. That's when he sees a car accident! Oh, no! One of the cars takes off, so he calls the police. When the police get to his house, they ask him, "Justin, what was the color of the car you saw?" Justin replies, "I am 80% sure that the color was blue." The police officer knows that 95% of all cabs in the city are green and 5% are blue. What is the probability that the cab was actually blue?

Solve these problems & turn in a solution to me by the end of the school day (2:32pm), and I will give you some extra credit. HOWEVER,… you must agree to the statement below & sign it. Also, write a couple sentences telling me how you solved these (with a partner, alone, using a book, etc…)

By signing below, I attest to the fact that I did not use the internet to help me solve this problem. Also, I did not blatantly copy this from another individual. (Working together is encouraged; copying is NOT.)

_____Student Signature