Math 16C
Kouba
Exam 3

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Print your name here.   Your HW #

1.   Please do not turn this page until told to do so.

2.   No notes, books, or classmates may be used as resources for this exam. YOU MAY USE A CALCULATOR ON THIS EXAM.

3.   Read directions to each problem carefully. Show all work for full credit. In most cases, a correct answer with no supporting work will *not* receive full credit. *What* you write down and *how* you write it are the most important means of your getting a good score on this exam. Neatness and organization are also important.

4.   Stay calm and put forth your best effort on this exam.

5.   Don't be overly alarmed by problems that you cannot immediately solve. Just maintain your composure and work at a steady rate.

6.   Make sure that you have seven (7) pages, including the cover page.

7.   You have until 8 : 50 o'clock sharp to finish the exam.

1.) (5 pts. each)   Determine the nth term (starting with n = 1) of each of the following sequences .

    a.)   16 , 25 , 36 , 49 , 64 , $\cdots$ _____

    b.)   1 , 3 , 5 , 7 , 9 , $\cdots$ _____

    c.)   3/1 , 6/2 , 9/6 , 12/24 , 15/120 , $\cdots$ _____

2.) (7 pts. each)   Determine whether the following series converge or diverge. State the name of the test you are using in each case.
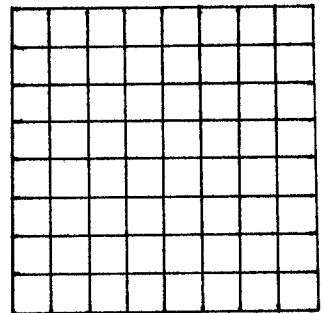
    a.) $\displaystyle\sum_{n=1}^{\infty} \frac{100}{n^3}$

    b.) $\displaystyle\sum_{n=1}^{\infty} \frac{5^n}{(2n)!}$

    c.) $\displaystyle\sum_{n=1}^{\infty} \frac{n^2+1}{\sqrt{5n^4+3n+2}}$

d.) $1/5 - 3/10 + 9/20 - 27/40 + 81/80 - \cdots$

3.) (12 pts.) Consider an 8 X 8 checkerboard. Place one (1) penny on square one ; place two (2) pennies on square two ; place four (4) pennies on square three ; place eight (8) pennies on square four ; place sixteen (16) pennies on square five ; etc. How many pennies will be needed to cover all the squares on the checkerboard ?

4.) (9 pts.) The following p-series converges. How many terms should be used to estimate the exact value of the series with error at most 0.001 ?

$$\frac{1}{1^6} + \frac{1}{2^6} + \frac{1}{3^6} + \frac{1}{4^6} + \cdots$$

5.) (12 pts.) Find the interval of convergence and radius of convergence for the following power series.

$$\sum_{n=0}^{\infty} \frac{(5x-3)^n}{2n+1}$$

6.) (12 pts.) What is the maximum number of triangles which can be formed within the boundary of the given figure using 200 lines passing through point A ? Count all triangles including overlapping ones.
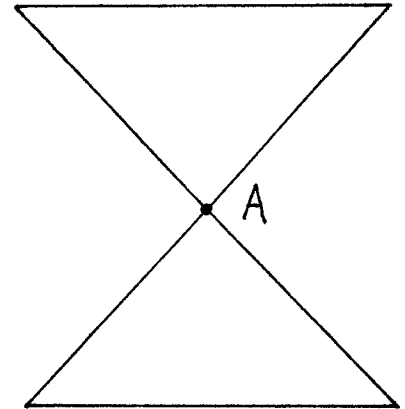
7.)   (12 pts.)   Evaluate $\displaystyle\int_0^{\pi/6}\int_0^{\pi/4} \cos^2(x+y)\ dy\ dx$. Please do not use a

calculator to evaluate trigonometry expressions.

EXTRA CREDIT PROBLEM -- Each of the following problems is worth 10 extra credit points and is *optional* .

1.)   Determine the nth term (starting with n = 1) of the following sequence.

   1/3 , 5/8 , 1/15 , 5/24 , 1/35 , 5/48 , 1/63 , . . .

2.)   Sketch the solid whose volume is represented by the following double integral. DO NOT EVALUATE THE INTEGRAL.

$$\int_{0}^{2} \int_{0}^{(2-x)/2} (y^2 + 1) \, dy \, dx$$