MATH 132 Second Midterm

Wednesday, April 10, 2013

Name: _____ **ID:** _____ **Rec:** ____

Question:	1	2	3	4	5	6	7	Total
Points:	10	10	10	10	10	15	10	75
Score:								

There are 7 problems in this exam, printed on 6 pages (not including this cover sheet). Make sure that you have them all.

Do all of your work in this exam booklet, and cross out any work that the grader should ignore. You may use the backs of pages, but indicate **clearly** what is where if you expect someone to look at it. **Books, calculators, electronic devices, extra papers, and discussions with friends are not permitted.** Leave all answers in exact form (that is, do *not* approximate π, square roots, and so on.) Confering with imaginary friends is allowed, provided you do so quietly. Confering with enemies (real or imaginary) is not recommended (nor is it allowed).

Use non-erasable pen (not red) if you want to be able to contest the grading of any problems. Questions with erasures will not be regraded.

You must give a correct justification of all answers to receive credit.

You have 90 minutes to complete this exam.

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10 pts 1. According to the poem by Ogden Nash,

Big fleas have little fleas,
Upon their backs to bite 'em,
And little fleas have lesser fleas,
And so, ad infinitum.

Assume each flea has exactly two fleas which bite it. If the largest flea weighs 0.8 grams, and each flea is 1/8 the weight of the flea it bites, what is the total weight of all the fleas?

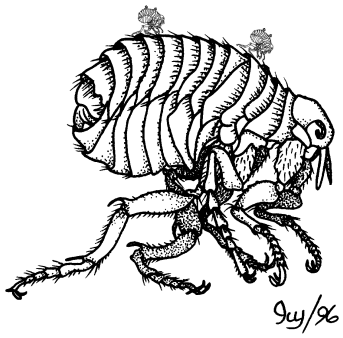

image adapted from
http://biodidac.bio.uottawa.ca

10 pts 2. The series $\sum_{n=1}^{\infty} \frac{1}{n^2}$ converges to $\frac{\pi^2}{6}$. How many terms are necessary so that $\sum_{n=1}^{K} \frac{1}{n^2}$ is within 1/1000 of $\pi^2/6$?

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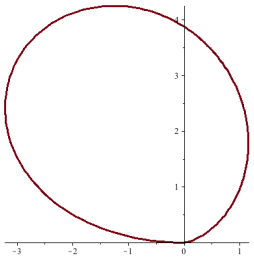
10 pts 3. Calculate the area lying inside the part of polar curve $r = \theta^2(\pi - \theta)$ where $r > 0$ and $\theta > 0$.



10 pts 4. The set of points for which $y^2 = 1 - 4x^2$ is an ellipse. Write an integral which represents the circumference of the ellipse (that is, the length of the curve around its boundary). **You do not have to evaluate this integral.**

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10 pts 5. Determine the interval of convergence of the power series $\sum_{n=1}^{\infty} \frac{(2x-7)^n}{n}$

15 pts 6. For each of the series below, determine whether it converges or diverges. You must fully justify your answer to get any credit (that is, indicate what test you used, etc.).

(a) $\displaystyle\sum_{n=2}^{\infty} \frac{2}{n \ln n}$

(b) $\displaystyle\sum_{n=1}^{\infty} \frac{n^3+5}{(n^3+2)(n^3+3)}$

(c) $\displaystyle\sum_{n=1}^{\infty} \frac{\cos(n)}{n^3}$

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10 pts 7. Calculate the volume of the solid obtained by revolving the area between the curves $y = 2x$ and $y = x^2$ around the line $x = -1$.

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