Math 126 2^{nd} Second Midterm

November 1, 2018

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

Question:	1	2	3	4	5	Total
Points:	24	12	12	12	12	72
Score:						

There are 5 problems on 5 pages (plus this cover sheet) in this exam. 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 what is where if you expect someone to look at it. **Books, calculators, extra papers, and discussions with friends are not permitted. No electronic devices may be used AT ALL.** This is the "2^{nd} second midterm" since the first midterm said it was the second one. It also said it was still October of 2016, which was just wishful thinking on my part.

Points will be taken off for writing mathematically false statements, even if the rest of the problem is correct.

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.

Leave all answers in exact form (that is, do *not* approximate π, square roots, and so on.) You might find it helpful to remember the following:

$$\sin^2\theta + \cos^2\theta = 1 \qquad \tan^2\theta + 1 = \sec^2\theta$$
$$\sin^2\theta = \tfrac{1}{2}\big(1 - \cos(2\theta)\big) \qquad \cos^2\theta = \tfrac{1}{2}\big(1 + \cos(2\theta)\big)$$

You have 90 minutes to complete this exam.

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1. Compute each of the following. If the integral does not converge, write "Diverges". You must justify your answer to receive full credit.

8 pts (a) $\displaystyle\int_1^{e^\pi} \frac{\sin(\ln x)\big(\cos(\ln x)\big)^4}{x}\,dx$

8 pts (b) $\displaystyle\int_3^{\infty} \frac{1}{x^2}\,dx$

8 pts (c) $\displaystyle\int_1^{4} \frac{1}{(x-2)^2}\,dx$

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12 pts 2. Compute the definite integral $\displaystyle\int_0^3 \frac{x^2}{\sqrt{9-x^2}}\,dx$.

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12 pts 3. Compute the indefinite integral $\int \frac{6x^2 + x + 2}{x(x^2 + 1)}\, dx$.

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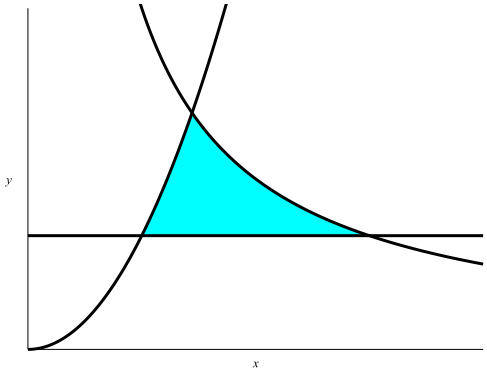
12 pts

4. Let $f(x) = x^2$ and $g(x) = 4/x$. Find the area of the region in the first quadrant lying below the graphs of both $f(x)$ and $g(x)$ and above the line $y = 1$.



12 pts 5. Use the trapezoid rule with 4 intervals to calculate an approximation to $\ln(3)$.
It is not necessary to add fractions, just write them as a sum.

If you don't remember the trapezoid rule, you may instead use a Riemann sum with 4 rectangles evaluated on the right, but lose 4 points for doing so.