

CALCULUS - for Computer Science and Engineering
Final Exam

Department of Computer Science and Engineering
National Sun Yat-sen University

January 04, 2012, 13:20 ~ 15:30

NAME: _____ Student ID No.: _____

Instructor: _____

General instructions:

1. Do not open this exam until you are told to begin.
2. This exam has 8 pages including this cover. There are 5 questions.
3. Do not separate the pages of the exam. If any pages do become separated, write your name on them and point them out to your instructor when you turn in the exam.
4. Please read the instructions for each individual problem carefully. One of the skills being tested on this exam is your ability to interpret questions, so instructors will not answer questions about exam problems during the exam.
5. Show an appropriate amount of work for each problem so that the graders can see not only the answer but also how you obtained it. Include units in your answers where appropriate.
6. You may use your calculator.
7. Do NOT use pencils but black or blue ball pens for your answers.
8. If you use graphs or tables to obtain an answer, be certain to provide an explanation and sketch of the graph to show how you arrived at your solution.
9. Please turn off all cell phones and pagers and remove all headphones.

Problem	1	2	3	4	5	Total
Points	60	15	15	15	15	120
Score						

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1. (60%) Evaluate the integrals in the following problems. (4% for each)

$$(1) \int_1^0 (3x^2 + x - 5) dx = \underline{\hspace{2cm}}.$$

$$(2) \int_{-3}^{-1} \frac{y^5 - 2y}{y^3} dy = \underline{\hspace{2cm}}.$$

$$(3) \int_1^2 \left(\frac{1}{x} - e^{-x} \right) dx = \underline{\hspace{2cm}}.$$

$$(4) \int \frac{\sin(2t + 1)}{\cos^2(2t + 1)} dt = \underline{\hspace{2cm}}.$$

$$(5) \int \frac{x}{(x - 4)^3} dx = \underline{\hspace{2cm}}.$$

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$$(6) \int (\sin 2\theta)e^{\sin^2 \theta} d\theta = \underline{\hspace{2cm}}.$$

$$(7) \int_0^9 \frac{2 \log_{10}(x+1)}{x+1} dx = \underline{\hspace{2cm}}.$$

$$(8) \int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx = \underline{\hspace{2cm}}.$$

$$(9) \int \frac{dx}{(x^2-1)^2} = \underline{\hspace{2cm}}.$$

$$(10) \int \frac{2s+2}{(s^2+1)(s-1)^3} ds = \underline{\hspace{2cm}}.$$

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$$(11) \int \frac{2x^3 - 2x^2 + 1}{x^2 - x} dx = \underline{\hspace{2cm}}.$$

$$(12) \int \frac{1}{x(x^4 + 1)} dx = \underline{\hspace{2cm}}.$$

$$(13) \int_0^1 \frac{\theta + 1}{\sqrt{\theta^2 + 2\theta}} d\theta = \underline{\hspace{2cm}}.$$

$$(14) \int_0^2 \frac{dx}{\sqrt{|x - 1|}} = \underline{\hspace{2cm}}.$$

$$(15) \int_{-\infty}^{\infty} \frac{4dx}{x^2 + 16} = \underline{\hspace{2cm}}.$$

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2. (15%) Find the average value of $f(t) = (t - 1)^2$ over the interval $[0, 3]$.

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3. (15%) Find the volume of the solid generated by revolving the region in the first quadrant bounded by the coordinate axes, the curve $y = e^x$, and the line $x = \ln 2$ about the line $x = \ln 2$.

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4. (15%) Find the area of the region between the curve $y = 2^{1-x}$ and the interval $-1 \leq x \leq 1$ of the x -axis.

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5. (15%) Suppose that $\int_1^x f(t)dt = x^2 - 2x + 1$. Find $f(x)$.