CALCULUS - *for Computer Science and Engineering*

Final EXAM

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

January 13, 2010, 13:15~ 15:20

NAME: _____ Student ID Nr.: _____

Instructor: _____

General Instructions:

1. Do not open this exam until you are told to begin.
2. This exam has 5 pages including this cover.
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 exercise 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. Include units in your answers where appropriate.
6. You may use your calculator.
7. Please turn off all cell phones and pagers and remove all headphones.

Problem	Part A	Part B	Total
Points	24	84	108
Score			

A. Please fill in the following blanks with your answers.
(2% for each blank)

1. The sum of the first *n* integers is $\sum_{k=1}^{n} k =$ _____.

2. Evaluate the sum: $\sum_{k=1}^{6}(k^2-5) =$ _____ .

3. If f is integrable on [a,b], then its average value on [a,b], also called its mean value, is $av(f) =$ _____ .

4. Suppose that f is integrable and that $\int_0^3 f(z)dz = 3$ and $\int_0^4 f(z)dz = 7$, then $\int_4^3 f(t)dt =$ _____ .

5. $\int_0^{\sqrt{2}} (t-\sqrt{2})dt =$ _____ .

6. $\int_1^0 (3x^2+x-5)dx =$ _____ .

7. What values of a and b minimize the value of $\int_a^b (x^4-2x^2)dx$?

   a = _____ , b = _____ .

8. The area of the region between the x-axis and the graph of $f(x) = x^3 - x^2 - 2x$, $-1 \le x \le 2$, is _____ .

9. Suppose that $y = \int_{\sqrt{x}}^{0} \sin(t^2)\,dt$, then $\frac{dy}{dx}$ = _____ .

10. $\int_1^x \frac{1}{t}\,dt$ = _____ , x > _____ .

B. Please fill in the following blanks with your answers.
(4% for each blank)

1. Suppose $\int_1^x f(t)\,dt = x^2 - 2x + 1$, then *f(x)* = _____

2. $\int \frac{1}{x^2}\cos^2\left(\frac{1}{x}\right)dx$ = _____ .

3. $\int r^2\left(\frac{r^3}{18} - 1\right)^5 dr$ = _____ .

4. The area of the region enclosed by the curves $4x^2 + y = 4$ and $x^4 - y = 1$ is : _____ .

5. $\int (2\theta + 1 + 2\cos(2\theta + 1))\,d\theta$ = _____ .

6. The volume of the solid generated by revolving the region bounded by the curve $y = \sqrt{x}$, the x-axis, and the line *x = 4* about the x-axis is _____ .

7. The length of the curve $y = \frac{4\sqrt{2}}{3}x^{3/2} - 1$, $0 \le x \le 1$, is _____ .

8. $\int_0^{\pi/3} 4\sec u \tan u \, du =$ _____ .

9. The region bounded by the curves $y = \frac{\pm 4}{\sqrt{x}}$ and the lines x=1 and x=4 is

revolved about the y-axis to generate a solid.

(a) the volume of the solid is _____ ;

(b) the center of mass of a thin plate covering the region if the plate's density at point (x,y) is $\delta(x) = 1/x$, is located at (x,y) = _____ .

10. $\int_0^{\frac{\pi}{3}} \frac{4\sin\theta}{1-4\cos\theta} d\theta =$ _____ .

11. $y = \ln\left(\frac{e^\theta}{1+e^\theta}\right)$, $\frac{dy}{d\theta} =$ _____ .

12. $\int_{\ln 4}^{\ln 9} e^{x/2} \, dx =$ _____ .

13. $\int 2te^{-t^2} \, dt =$ _____ .

14. $\int \frac{dx}{x(\log_8 x)^2} =$ _____ .

15. $\int_2^4 x^{2x}(1+\ln x)dx =$ _____ .

16. $\int \frac{x}{x+1} dx$ = _____ .

17. $\int x^2 e^x \, dx$ = _____ .

18. $\int e^\theta \sin\theta \, d\theta$ = _____ .

19. $\int \frac{6x+7}{(x+2)^2} dx$ = _____ .

20. $\int_{-\infty}^{\infty} \frac{dx}{1+x^2} =$ _____ .

(End of this exam.)