Prince Sultan University

Deanship of Educational Services

Department of Mathematics and General Sciences

COURSE DETAILS:

Calculus II	**MATH 113**	**FINAL EXAM**
Semester:	Fall Semester -- Term 182	
Date:	Saturday April 20th, 2019	
Time Allowed:	3 Hours	

STUDENT DETAILS:

Student Name:	
Student ID Number:	
Section:	
Instructor's Name:	

INSTRUCTIONS:

- You may use a scientific calculator that does not have programming or graphing capabilities.
- NO borrowing calculators.
- NO talking or looking around during the examination.
- NO mobile phones. If your mobile is seen or heard, your exam will be taken immediately.
- Show all your work and be organized.
- You may use the back of the pages for extra space, but be sure to indicate that on the page with the problem.

GRADING:

	Page 2	**Page 3**	**Page 4**	**Page 5**	**Page 6**	**Total**	**Total**
Questions	**#1, #2**	**#3**	**#4**	**#5**	**#6**		
Marks	**16**	**12**	**12**	**24**	**16**	**80**	**40**

Problem 1: (8 points) Sketch the region enclosed by the curves $y = x^2$ and $y = x^3$ and find its area.

Problem 2: (8 points) Use the method of cylindrical shells to find the volume generated by rotating the region bounded by the curves $y = x^2,\ y = 6,\ x = 0$ about the x-axis.

Problem 3: (12 points; 4 points each) Evaluate the following integrals.

a) $\int 7xe^{2x^2}\,dx$

b) $\int x^2 \sin \pi x\,dx$

c) $\int 5x(2x+1)^5 dx$

Problem 4: (12 points; 6 points each)

a) Write down the partial fraction decomposition of the function

$$f(x) = \frac{4}{(x^2 - 9)(x - 2)}$$

b) Evaluate the integral $\int f(x)dx$, where $f(x)$ is the function in part (a).

Problem 5: (24 points; 6 points each)

Determine whether the following series converges or diverges.

a) $\sum_{n=1}^{\infty} \frac{\ln(n)}{n^2}$

b) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{7n-2}$

c) $\sum_{n=1}^{\infty} \frac{(-2)^n}{n^4}$

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

Problem 6: (16 points; 8 points each)

Determine for which x, the following series converges.

a) $\sum_{n=1}^{\infty} \frac{x^n}{2n+1}$

b) $\sum_{n=1}^{\infty} \frac{(x-6)^n}{n^4}$