

**QUEEN'S UNIVERSITY**  
**APSC 171J – Assignment 4**  
**Wesley Burr**  
**Due: February 7, 2013**

**INSTRUCTIONS**

- This assignment is due in-class (4:30-5:20pm) Thursday, February 7, 2013.
- Answer all questions, writing clearly on the sheets provided. **You must print this file and hand in a carefully stapled copy!** Unstapled assignments will not be accepted.
- One mark in each question is for **complete** (and mostly correct) work shown
- The second mark is for a **fully** correct solution, which **must** be placed in the box provided
- If more than two marks are provided for a question, expect the question to require more work and logically divide into sections, each of which will be worth a mark.
- Whenever possible, simplify your solution.
- There are no part marks: you will receive integer marks only for each question.

FOR INSTRUCTOR'S USE ONLY		
Question	Mark Available	Received
1	3	
2	2	
3	2	
4	2	
5	3	
6	3	
7	2	
8	4	
9	2	
TOTAL	23	

1. [3 marks] Find the volume of the solid generated by rotating about the line  $y = -1$  the region bounded by the graphs  $y = x^2$  and  $y = 2 - x$ . Include a carefully drawn diagram.

Final Answer:

2. [2 marks] Find the solution to the integral

$$\int \sin(x) \cos(x) e^{\sin(x)} dx.$$

Final Answer:

3. [2 marks] Let  $A$  be the area bounded by  $y = 1 - x^4$  and  $y = x^2 - x^4$ . Find the area of  $A$  and include a carefully labeled diagram.

Final Answer:

4. [2 marks] Determine the following definite integral:

$$\int_0^{0.5} \frac{x}{\sqrt{1-x^2}} dx.$$

Final Answer:

5. [3 marks] Find the volume of the solid formed when the region bounded by  $y = x^2 + 1$ ,  $x = 1$  and  $y = 1$  is rotated about the line  $x = -1$ . Include a carefully drawn diagram.

Final Answer:

6. [3 marks] Find the volume of the solid obtained by rotating the area between the curves  $y = x^2$  and  $y = x^3$  about the line  $x = -1$ . Include a carefully drawn diagram.

Final Answer:

7. [2 marks] Solve the definite integral

$$\int_0^{\pi} |\cos(x)| dx.$$

Final Answer:



8. [4 marks] The region bounded by the sideways parabola  $x = y^2 + 2$ , the line  $x = 1$  and the lines  $y = -1$  and  $y = 1$  is rotated about the  $y$ -axis to form a solid  $B$ . Find the volume of  $B$ . Include a carefully drawn diagram.

Final Answer:

9. [2 marks] Solve the following improper integral:

$$\int_0^{\infty} \frac{x}{(1+x^2)^2} dx.$$

Final Answer: