Simon Fraser University

MATH 152
Final Examination

August 4, 2004

Name (***please print***): ____
Last name *Given names*

Student Number: ____

Signature: ____

NOTES:
- Show all workings. No credit will be given for unsupported answers.
- The use of *any* calculator is strictly prohibited.
- You have 3 hours to complete the examination.
- No notes or aids are permitted during the examination.
- Ensure that your examination contains 8 pages (including this cover page) with 10 questions.

DO NOT WRITE BELOW THIS LINE

Question	Marks	Score
#1	5	
#2	4	
#3	12	
#4	4	
#5	4	
#6	14	
#7	3	
#8	7	
#9	5	
#10	4	
TOTAL	62	

1. Use the <u>definition of the definite integral</u> (with right end-points) to evaluate the integral $\int_0^2 (x^2 - x)\,dx$. [5]

2. Find the volume of the solid obtained by rotating the region bounded by $y = x - x^2$ and $y = 0$ about the line $x = 2$. [4]

3. Integrate the following:

a) $\int \frac{x+4}{x^3+x}\,dx$ [4]

b) $\int_0^{\pi/2} \sin^4 x \cos^3 x\,dx$ [4]

c) $\int e^{x} \sin(2x)\,dx$ [4]

4. Find the length of the curve $y = \frac{2}{3}(x^2 + 1)^{3/2}$ on $0 \le x \le 2$. [4]

5. Find the equation of a curve in the xy – plane that passes through (0, 3) and whose tangent at any point (x, y) has a slope $\dfrac{2x}{y}$. (Hint: Set up and solve the differential equation) [4]

6. Determine whether the following series converge or diverge. State the test(s) being used.

a) $\displaystyle\sum_{n=1}^{\infty} \frac{n^4}{(1+n^2)^3}$ [4]

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

[6]

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

7. Calculate the minimum number of terms needed to guarantee that the approximation of the sum $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n}$ is correct to two decimal places. [3]

8. Determine the interval of convergence for $\sum_{n=0}^{\infty} \frac{(x-2)^n}{2^n(n+1)}$. [7]

9. Use a power series to evaluate the integral $\int_0^1 e^{-x^2}\,dx$. You need only write the first <u>four</u> terms of your answer. [5]

10. Find a fourth degree Taylor polynomial for $f(x) = \ln x$ about $a = 1$. [4]