SIMON FRASER UNIVERSITY

MATH 155 Midterm 2

7 March 2007, 08:30–09:20

Last Name _____

Given Name(s) _____

Student # _____

Signature _____

INSTRUCTIONS

1. **Do not open this booklet until told to do so**.
2. Write your last name, given name(s), and student number in the box above. Sign on the last line of the box.
3. This exam has 6 questions on 6 pages. Check to make sure that your exam is complete.
4. No book, paper or device other than usual writing instruments, this examination booklet, and a scientific calculator are allowed. **Calculators with graphing and/or symbolic computation capabilities are not allowed.**
5. **During the examination, speaking to, communicating with, or exposing written papers to the view of other examinees is forbidden**.
6. You may use the **reverse side of the previous page** for rough work or if you run out of space.
7. **You may lose marks if your explanations are incomplete or poorly presented.**
8. **Stop writing when you are instructed to do so. Failure to follow instructions may result in penalties.**

Question	Maximum	Score
1	6	
2	6	
3	10	
4	6	
5	8	
6	9	
Total	45	

[6] **1.** Evaluate $\displaystyle\int \frac{3x-1}{x^2-2x-3}\,dx.$

[6] **2.** Evaluate $\displaystyle\int \frac{x^2+6x+5}{x^2+4}\,dx.$

[5] **3.** (a) Use integration by parts to find $\int \ln x \, dx$. (Hint: Multiply by 1.)

[5] (b) Explain why the integral

$$\int_0^1 \ln x \, dx$$

is improper. Evaluate this integral. (Use the result of part (a).)

[6] **4.** Use the trapezoidal rule with $n = 4$ intervals to find an approximation for $\int_0^1 \sqrt{x}\, dx$. Compare the approximation with the exact value of the integral.

[6] **5.** (a) Compute the Taylor polynomial of degree 5 about $x = 0$ for the function $f(x) = \sin(x)$.

[2] (b) Use the polynomial found in part (a) to approximate the value $\sin(1.3)$. Compare this approximation with the exact value of $\sin(1.3)$.

6. Let $L(t)$ denote the length of the fish at age t. It is known that the function $L(t)$ satisfies the differential equation

$$\frac{dL}{dt} = k(A - L)$$

where k and A are certain positive constants. Suppose that the length of the fish at birth (at age $t = 0$) is L_0, where $0 < L_0 < A$.

[6] (a) Solve the differential equation given above. Do not forget to consider the initial condition $L(0) = L_0$.

[3] (b) Use your answer to part (a) to characterize the length of the fish at maturity (at very large age).