MA114:012–014 Russell Brown

Exam 1 10 February 1998

Answer all of the following questions. Use the backs of the question papers for scratch paper. Additional sheets are available if necessary. No books or notes may be used. When answering these questions, please be sure to 1) check answers when possible, 2) clearly indicate your answer and the reasoning used to arrive at that answer **(unsupported answers may receive NO credit)**, and 3) label all variables and equations.
If you use your calculator to solve an equation or produce a graph, please indicate this on your test paper. Otherwise the answer will be assumed to be "unsupported".

Name ____________________

Section __________

Question	Score	Total
1		30
2		15
3		15
4		10
5		20
6		10
Total		100

1. Evaluate the following integrals.

(a) $\displaystyle\int_2^3 x + \cos(x)\, dx$

(b) $\displaystyle\int_1^2 x e^{x^2}\, dx$

(c) $\int x \sin(2x)\, dx$

(d) $\int_{-1}^{1} x^3 \cos(x^2)\, dx$

(e) $\displaystyle\int_0^1 \frac{1}{x^2 + 2x + 2}\,dx$

(f) $\displaystyle\int_2^3 \frac{1}{x(x+1)}\,dx$

2. (a) State the mean value theorem.
   (b) State the evaluation theorem.
   (c) Give the proof of the evaluation theorem.

3. Use a geometric argument to compute the integral

$$\int_0^3 |x-1|\,dx.$$

Hint: Draw a graph.

4. Give the partial fractions decomposition of

$$\frac{1}{x(x^2+4)}.$$

Note: This question does not ask you to evaluate an integral.

5. Compute the following derivatives:

(a) $\dfrac{d}{dx}\displaystyle\int_1^x \sin(t^2)\,dt$

(b) $\dfrac{d}{dx}\displaystyle\int_{\cos x}^0 \ln t\,dt$

6. At a time t hours after noon, a black and white cow is running north at a speed of $v(t) = 3t^2 - 2t$ miles per hour? How far does the cow run between 1:00 pm and 1:15 pm?