# MATH 155 — Quiz #1

February 6, 1995

Please make sure you received 2 pages (including this cover page) with 4 problems. You have 45 minutes for the exam, and you may attempt the problems in any order. You may use a one-page summary of your notes during this exam. No other help is allowed. Write your answers in the space provided. If you need more space, attach additional pages.

*Good Luck!*

| | |
|---|---|
| Name: | |
| Student number: | |

| Problem | Maximum | Points received |
|---|---|---|
| 1 | 40 | |
| 2 | 20 | |
| 3 | 20 | |
| 4 | 20 | |
| Total | 100 | |

**Problem 1** Find an antiderivative $F$ of the function $f$ ($F(x) = \int f(x)dx$). Check the appropriate box for all correct answers. Note that at least one and at most two answers are correct. (10 points for each function, -1 for incorrect checks; -5 if more than two answers are checked for one example.) $C$ is a generic constant. *Hint:* $\frac{d}{dx}\tan x = 1 + \tan^2 x$.

| | $f(x) =$ | $F(x) = \int f(x)dx =$ | check |
|---|---|---|---|
| a) | $3x + \frac{1}{3x}$ | $\frac{3}{2}x^2 + \ln\lvert 3x\rvert + C$ | ☐ |
| | | $\frac{3}{2}x^2 + \frac{1}{3}\ln\lvert x\rvert + C$ | ☐ |
| | | $\frac{3}{2}x^2 + \frac{1}{3}\ln\lvert 3x\rvert + C$ | ☐ |
| | | $x^3 + \frac{1}{3}\ln\lvert 3x\rvert + C$ | ☐ |
| | | None of the above | ☐ |
| b) | $3x^2 + 3x^{-2}$ | $x^3 + 3x^{-1} + C$ | ☐ |
| | | $x^3 - 3x^{-1} + C$ | ☐ |
| | | $x^3 - x^{-3} + C$ | ☐ |
| | | $x^3 + x^{-3} + C$ | ☐ |
| | | None of the above | ☐ |

| | $f(x) =$ | $F(x) = \int f(x)dx =$ | check |
|---|---|---|---|
| c) | $\tan^2 x$ | $\tan x - 1 + C$ | ☐ |
| | | $\tan x + x + C$ | ☐ |
| | | $\tan x + C$ | ☐ |
| | | $\frac{1}{3}\tan^3 x + C$ | ☐ |
| | | None of the above | ☐ |
| d) | $\ln(2x)$ | $\frac{1}{2x} + C$ | ☐ |
| | | $x\ln(2x) - x + C$ | ☐ |
| | | $2x\ln(2x) - 2x + C$ | ☐ |
| | | $x\ln x + x\ln 2 - x + C$ | ☐ |
| | | None of the above | ☐ |

**Problem 2** What are the values of the following definite integrals. Check the appropriate box (exactly one answer is correct). 10 points for each function, -1 for incorrect checks, -5 if more than one answer is checked

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a) | $\int_{-1}^{+1}(x-x^3)dx$ | $\frac{1}{2}$ | ☐ | b) | $\int_0^{\pi}\sin x\cos x dx$ | $\frac{1}{2}$ | ☐ |
| | | $\frac{1}{4}$ | ☐ | | | 0 | ☐ |
| | | $-\frac{1}{2}$ | ☐ | | | $\pi$ | ☐ |
| | | $-\frac{1}{4}$ | ☐ | | | 1 | ☐ |
| | | None of the above | ☐ | | | None of the above | ☐ |

**Problem 3** What is ... (5 points each)

$$\frac{d}{dx}\left(\int_0^x e^{t^2}\,dt\right) =$$

$$\int_0^x \frac{d}{dt}(t^2-t)\,dt =$$

$$\frac{d}{dx}\left(\int_1^2 \ln t\,dt\right) =$$

$$\frac{d}{dx}\left(\int_x^2 t\,dt\right) =$$

**Problem 4** Find the definite integral

$$\int_1^2 \frac{dx}{x(x+1)}.$$

Show your work (20 points).