SIMON FRASER UNIVERSITY

MATH 155 Midterm 1

3 February 2010, 08:30–09:20

Last Name _____

Given Name(s) _____

Student # _____

SFU e-mail _____@sfu.ca

Circle section number: D100 D400

Signature _____

INSTRUCTIONS

1. **Do not open this booklet until told to do so**.
2. Fill out the box in the upper right corner of this page.
3. This exam has 6 questions on 5 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 so.**

1. Indicate whether the following statements are true (T) or false (F). Justifications are not required.

   Assume that $f(x)$ is continuous in the intervals of integration.

   A statement containing general constants a, b, c and functions f, g is true if and only if it holds for *all admissible choices* that you can make for a, b, c, f, g.

[1] (a) _____ If $f(x) \geq c$ for all x in $[a, b]$, then $\int_a^b f(x)\,dx \geq c(b-a)$.

[1] (b) _____ $\int_a^b (f(x) - g(x))\,dx = \int_a^b f(x)\,dx + \int_b^a g(x)\,dx$

[1] (c) _____ $\int_a^b (f(x))^2\,dx = \left(\int_a^b f(x)\,dx\right)^2$

[1] (d) _____ $\int_a^b f(x)\,dx = \int_a^c f(x)\,dx - \int_c^b f(x)\,dx$

[1] (e) _____ $\sum_{k=10}^{20} f(k) = \sum_{k=1}^{20} f(k) - \sum_{k=1}^{10} f(k)$

[1] (f) _____ $\int_{-a}^{a} 3\sin x\,dx = 0$

[1] (g) _____ There is a point d in $[a, b]$ such that $f(d) = \int_a^b f(x)\,dx$.

[4] 4. (a) Express the sphere of radius r as a solid of revolution. (This involves specifying a certain function and an interval on the x-axis.)

[4] (b) Use the formula for the volume of a solid of revolution to evaluate the volume of the sphere of radius r.

[8] 5. Find $\int \frac{(\sin x)^3}{\cos x}\, dx$.

Hint: Split the numerator into two factors, and use $(\sin x)^2 + (\cos x)^2 = 1$.

[8] 6. Evaluate $\int_3^4 \frac{5}{x\sqrt{\ln(3x)}}\,dx$.