

SIMON FRASER UNIVERSITY

MATH 155 Midterm 2

17 March 2010, 08:30–09:20

Last Name

[7] 1. Find $\int \frac{x + 11}{x^2 + 4x - 5} dx$.

2. For each of the following two improper integrals, determine whether it is convergent or divergent. If the integral is convergent, determine its value.

[4] (a) $\int_1^4 \frac{2}{(x-3)^2} dx$

[4] (b) $\int_5^{\infty} \frac{2}{(x-3)^2} dx$

[7] 3. Evaluate $\int x^2 \cos x \, dx$.

- [4] 4. Use the trapezoidal rule with $n = 4$ intervals to approximate the value of $\int_3^5 x^2 dx$. Compare the approximation with the exact value of the integral.

[7] 5. Solve the differential equation

$$\frac{dy}{dx} = 2\sqrt{y}$$

with the initial condition $y(0) = 4$.

6. Let r and K be positive constants. The differential equation

$$\frac{dN}{dt} = rN \left(1 - \frac{N}{K} \right)$$

describes a well known growth model.

- [3] (a) Give the name of the model and describe the meaning of the symbols in the differential equation.
- [4] (b) Let $r = 0.1$ and $K = 100$. Find the equilibria of the differential equation and the eigenvalues associated with them. Use the eigenvalues to determine the stability of the equilibria.