

The final exam is Wednesday 15 March from 12:20-2:20pm.

Here are some sample questions, so that you have an idea of what to expect.

1. Suppose f is a differentiable function with the following properties:

$$f(0) = e$$

$$f(1) = e^3$$

$$f(2) = e^5$$

$$\int_0^1 f(x)dx = \pi$$

$$\int_1^2 f(x)dx = \pi^3$$

$$\int_2^3 f(x)dx = \pi^5$$

Evaluate the following. If one cannot be evaluated with the given information, write "Not Enough Information." You do **not** need to justify your answer or show your work.

$$\int_0^1 f(r)dr = , \int_3^2 f(x)dx = , \int_0^1 |f(x)|dx = , \int_0^3 f(x)dx = , \int_0^2 f'(x)dx = , \int_6^6 f(x)dx = , \int_1^2 (f(x) + 5)dx = , \int_0^{14} f(x)dx - \int_2^{14} f(x)dx = , \int_1^3 f(1)dx = , \frac{d}{dt} \int_3^4 f(x)dx =$$

2. (a) $\int x + \sin(7) + \frac{3}{1+x^2} - x^{-1/2} dx =$

(b) $\int_2^3 x \sin(5x) dx =$

(c) $\int_1^2 5x^2 e^{-x^3} dx =$

(d) $\int \frac{x^2}{2+x^3} \ln(2+x^3) dx =$

3. (a) Solve the differential equation $\frac{dr}{ds} = \frac{e^s}{\sin(r)}$, where $s_0 = 5$ for $r_0 = 7$.

(b) Solve the differential equation $\frac{dN}{dt} = (N-1)(N-3)$ where $N(0) = 7$.

4. Dang! You are supposed to feed the tissue culture before leaving town for the weekend, but the bottle is empty and everyone else has left already. You normally give it 5ml of a solution that has 2g/ml glucose and 3g/ml sucrose. You find a blue bottle that has 30g/ml glucose and 20g/ml sucrose, and a green bottle that has 10g/ml glucose and 20g/ml sucrose. There is also a supply of distilled water. What do you do?

5. Solve the system of differential equations

$$\frac{dx_1}{dt} = 4x_1 + 7x_2$$

$$\frac{dx_2}{dt} = x_1 - 2x_2$$

with $x_1(0) = 2$ and $x_2(0) = -1$.

6. Check out <http://www.math.ohiou.edu/math/programs/minorinmath.html>