

MATH 165

Midterm

Thursday, February 21, 2008

Show all work (each step/computation) to receive full credit. No calculators. The exam contains 5 problems. Make sure it is complete.

No.	VALUE	SCORE
1	20	
2	20	
3	20	
4	20	
5	20	
TOTAL	100	

NAME : _____

SECTION : _____

1. Find the equation of the curve $y = f(x)$ that passes through the point $(-1, 1)$ and whose slope at each point (x, y) is x^2y^2 .

2. Solve the equation $ty' - 3y = t^4$, with $y(1) = 4$.

3. Initially, a 100-liter tank contains a salt solution with concentration 0.5 kg/liter. A fresher solution with concentration 0.1 kg/liter flows into the tank at the rate of 4 liter/min. The well-stirred mixture leaves the tank at the same rate.

- a) Find the amount of salt in the tank as a function of time.
- b) Determine the concentration of salt in the tank at any time.

4. Find the reduced row-echelon form, and hence the rank of the following matrix:

$$\begin{bmatrix} 2 & -3 & -1 & -8 \\ 1 & 1 & 1 & 3 \\ -1 & 2 & 2 & 3 \end{bmatrix}$$

5. Use Gauss-Jordan elimination to solve the following system of equations:

$$\begin{cases} x + 2y + z = 2 \\ x - y = 4 \\ 2x - y + 2z = 0 \\ 3y + z = -2 \end{cases}$$