

Math 2503  
Final Exam April 1998  
Answers

1 a)  $y - \ln(y+1) = x - \ln x$   
b)  $y = (x+2) \cos x$

2 a)  $y = C_1 e^x + C_2 x e^x + x^2 + 4x + 7$   
b)  $y = A e^x + B e^{2x} - x e^x$   
c)  $y = A \cos x + B \sin x + \sin(2x)$

3  $y = A e^{3x} + B x e^{3x} - (\ln x) e^{3x}$

4  $y = a_0 \sum_0^{\infty} \frac{(-1)^n x^{2n}}{n!} + a_1 \sum_0^{\infty} \frac{(-2)^n x^{2n+1}}{3 \cdot 5 \cdots (2n+1)}$

~~or~~  $y = a_0 (1 - x^2 + \frac{x^4}{2} - \dots) + a_1 (x - \frac{2}{3} x^3 + \frac{4}{15} x^5 - \dots)$

5 a)  $\frac{1}{2}$  b)  $\frac{45}{116}$

6 a) DIV b) DIV c) CONV.

7 a)  $[-5, 1]$

b)  $e^{2x} = e^2 \sum_0^{\infty} \frac{2^n (x-1)^n}{n!}$

8  $(\frac{7}{2} - \frac{x_3}{2}, -\frac{1}{2} + \frac{x_3}{2}, x_3)$

$= (\frac{7}{2}, -\frac{1}{2}, 0) + t(1, -1, 2)$

$$9a) A^{-1} = \begin{bmatrix} -1 & 1 & -1 \\ 2 & -1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$$

$$\text{and } X = \begin{bmatrix} -2 \\ 6 \\ 3 \end{bmatrix}$$

b) Cramer's Rule was not covered this year.

$$10a) -k^3 + 2k^2 + 5k - 6 = 0$$

b)  $k = 3$  is a root

c)  $k = -2$  has eigenvectors  $\{c(-1, 1, 1)\}$