MATH 6171 Answers for Homework I Fall 2005

For even number problems in Chapters 4 & 5 only

Section 4.1

4 $y = a_0 \left(1 + x + x^2 + \cdots + x^n + \cdots\right).$

10 $y = a_0 + a_1 \left(1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots\right)$

Section 4.2

6 $y = (a_0 + a_1 x)\left(1 + x^2 + \frac{x^4}{2!} + \frac{x^6}{3!} + \cdots\right) = (a_0 + a_1 x)e^{x^2}.$

8 $y = a_1 x + a_0 \left(1 - x^2 - \frac{x^4}{3} - \frac{x^6}{5} + \cdots\right)$

Section 4.5

12 $J_0' = \sum_{m=0}^{\infty} \frac{2m(-1)^m x^{2m-1}}{2^{2m}(m!)^2} = \sum_{m=1}^{\infty} \frac{(-1)^m x^{2m-1}}{2^{2m-1} m!(m-1)!} = \sum_{s=0}^{\infty} \frac{(-1)^{s+1} x^{2s+1}}{2^{2s+1}(s+1)!s!}.$

Section 4.7

6 $\lambda = n^2, n = 0, 1, \cdots; y_0(x) = 1; y_n(x) = \cos nx, \sin nx, n \geq 1.$

Section 4.8

6 $e^x = 1.1752P_0 + 1.1036P_1 + 0.3578P_2 + 0.0705P_3 + \cdots$

Section 5.1

4 $1/2s + s/(2s^2 + 8\omega^2).$

6 $\dfrac{s-1}{s^2 - 2s - 8}.$

8 $2/(s^2 + 16).$

20 $\cosh 2t - 2\sinh 2t.$

22 $\frac{1}{2}t^2 + \frac{1}{4}t^4 + \frac{1}{12}t^6.$

24 $e^t + e^{-2t} - 2e^{3t}.$

32 $\dfrac{1}{s+1} + \dfrac{s+1}{s^2+2s+2}$.

34 $\dfrac{2}{(s-1)^3} + \dfrac{2}{(s-1)^2} + \dfrac{1}{s-1}$.

38 $2e^t \sinh 2t = e^{3t} - e^{-t}$.

Section 5.2

2 $\frac{7}{6}e^{5t} - \frac{1}{6}e^{-4t}$.

4 $3e^{-t} + 5e^{2t}$.

14 $e^{2t} - 2t - 1$.

Section 5.3

2 $e^{-s}\left(\dfrac{1}{s^2} + \dfrac{1}{s}\right)$.

6 $e^{-3s-6}/(s+2)$.

8 $2s^{-3} - e^{-s}(2s^{-3} + 2s^{-2} + s^{-1})$

14 $4u(t-2) - 8u(t-5)$.

22 $y = 4e^{-t} - e^{-2t} + 2t - 3 + \left[5 - 2(t-1) - 8e^{-(t-1)} + 3e^{-2(t-1)}\right] u(t-1)$.

26 $y = 2\cos 4t + u(t-\pi)\sin 4(t-\pi)$.

30 $y = e^{-2t} - e^{-3t} + u(t-1)(\frac{1}{6} - \frac{1}{2}e^{-2(t-1)} + \frac{1}{3}e^{-3(t-1)}) + u(t-2)(e^{-2(t-2)} - e^{-3(t-2)}$.