

Review for Exam IV

MATH 2306 sections 51 & 54

Sections Covered: 7.2, 7.3, 11.2, 11.3

This review is provided as a courtesy to give some idea of what material is covered. Nothing else is intended or implied.

(1) Find the Laplace transform using any method.

(a) $f(t) = e^{3t}(t-1)^2$

(b) $f(t) = t^2 \mathcal{U}(t-1) - e^t \mathcal{U}(t-4)$

(c) $f(t) = \begin{cases} 2t, & 0 \leq t < 3 \\ 1, & 3 \leq t \end{cases}$

(2) Find the inverse Laplace transform using any method.

(a) $F(s) = \frac{s}{s^2 - 4s + 10}$

(b) $F(s) = \frac{2s + 5}{(s - 3)^2}$

(c) $F(s) = \frac{3e^{-2s}}{s(s + 1)^2}$

(3) Solve the IVP using the Laplace transform.

(a) $y'' - 2y' + 5y = 0, \quad y(0) = 2, \quad y'(0) = 4$

(b) $y'' + 4y' + 4y = 42t^5 e^{-2t} \quad y(0) = 1, \quad y'(0) = 0$

(4) Solve the IVP using the Laplace transform.

$$y'' + y = \mathcal{U}\left(t - \frac{\pi}{4}\right), \quad y(0) = 0, \quad y'(0) = 2$$

(5) Find the Fourier series of the given function.

$$f(x) = \begin{cases} 0, & -1 < x < 0 \\ 2x, & 0 \leq x < 1 \end{cases}$$

(6) Without actually computing either half range series, produce a plot of the graph of three periods on the interval $(-3p, 3p)$ of (a) the half range cosine series, and (b) the half range sine series of the given function.

$$f(x) = 4 - x^2, \quad 0 < x < 2$$

(7) Find (a) the half range sine series and (b) the half range cosine series for f .

$$f(x) = \begin{cases} 1, & 0 < x < 1 \\ 2 - x, & 1 \leq x < 2 \end{cases}$$

(8) Find the Fourier series of

$$f(x) = \begin{cases} -x - 1, & -1 < x < 0 \\ 1 - x, & 0 \leq x < 1 \end{cases}$$