MAP2302: Differential Equations.

http://www.imathesis.com/map2302.html

Practice 11.

Topics: 7.4, 7.5: Inverse Laplace Transform. Solving Initial value problems.

Exercises 7.4 page 374:

Determine the inverse Laplace Transform of the given function:

1. $\dfrac{6}{(s-1)^4}$ 3. $\dfrac{s+1}{(s^2+2s+10)}$ 5. $\dfrac{1}{(s^2+4s+8)}$ 7. $\dfrac{2s+16}{(s^2+4s+13)}$ 9. $\dfrac{3s-15}{(2s^2-4s+10)}$

Determine the partial fraction expansion for the given rational function:

11. $\dfrac{s^2-26s-47}{(s-1)(s+2)(s+5)}$ 13. $\dfrac{-2s^2-3s-2}{s(s+1)^2}$ 15. $\dfrac{8s-2s^2-14}{(s+1)(s^2-2s+5)}$ 17. $\dfrac{3s+5}{s(s^2+s-6)}$

Determine the $\mathcal{L}^{-1}\{F\}$

21. $F(s)=\dfrac{6s^2-13s+2}{s(s-1)(s-6)}$ 23. $F(s)=\dfrac{5s^2+34s+53}{(s+3)^2(s+1)}$ 25. $\dfrac{7s^2+23s+30}{(s-2)(s^2+2s+5)}$

Exercises 7.5 page 382:

Solve the initial value problem using the method of Laplace Transforms:

1. $y''-2y'+5y=0;\quad y(0)=2,\quad y'(0)=4$

3. $y''+6y'+9y=0;\quad y(0)=-1,\quad y'(0)=6$

5. $w''+w=t^2+2;\quad w(0)=1,\quad w'(0)=-1$

7. $y''-7y'+10y=9\cos t+7\sin t;\quad y(0)=5,\quad y'(0)=-4$

9. $z''+5z'-6z=21e^{t-1};\quad z(1)=-1,\quad z'(1)=9$

11. $y''-y=t-2;\quad y(2)=3;\quad y'(2)=0$

13. $y''-y'-2y=-8\cos t-2\sin t;\quad y(\pi/2)=1\quad y'(\pi/2)=0$

Solve for $Y(s)$, the Laplace Transform of the solution $y(t)$ to the given initial value problem.

15. $y''-3y'+2y=\cos t;\quad y(0)=0,\quad y'(0)=-1$

17. $y''+y'-y=t^3;\quad y(0)=1,\quad y'(0)=0$

19. $y''+5y'-y=e^t-1;\quad y(0)=1,\quad y'(0)=1$

21. $y''-2y'+y=\cos t-\sin t;\quad y(0)=1,\quad y'(0)=3$