MATEMÁTICAS II - 03/01/2012

Assignment 2 to be handwritten and delivered on **11th January**. Presentation in English is encouraged and neatness will be had taken into account.
(Actividad 2 para ser escrita a mano y entregada el **miércoles 11 de enero**. La presentación y claridad se tendrán en cuenta.

1.- Chapter 5 Exercise 6 of SPUPV 798, i.e.: Find $\mathcal{L}\left[\frac{1}{4\sqrt[5]{x^3}}+\frac{1}{2\sqrt[10]{x}}-\sqrt[20]{x^3}\right]$ by using the Γ function.

2.- Chapter 5 Ex. 18: Show that $\mathcal{L}\left[\frac{\cos ax-\cos bx}{x}\right]=\frac{1}{2}\ln\frac{s^2+b^2}{s^2+a^2}$

3.- Chapter 5 Ex. 36: Find $\mathcal{L}\left[f(x)\right]$ where f is an antiperiodic function whose period is 4 and satisfies $f(x)=\ 2-x,\ \ 0\le x<1,\qquad f(x)=\ 0,\ \ 1\le x<2.$

4.- Ch.5 Ex. 40 (b): Find $\mathcal{L}^{-1}\left[\frac{2s+1}{s^2-2s+2}\right]$

5.- Ch.5 Ex. 40 (k): Find $\mathcal{L}^{-1}\left[\frac{3s^2+8s-1}{(s-3)(s+2)^2}\right]$

6.- Ch.5 Ex. 51: Find the output of a dynamic system in which there is a $\delta(t)$ impulse input and null initial conditions by knowing that the output is $y(t)=e^{-2t}\cos(3t+\frac{\pi}{4})$ if the input is $e(t)=3u\,(t)$, i.e. three times the Unit Step function.

7.- Ch. 5 Ex. 53(b): Solve $y''+4y'+4y=t-tu(t-1)-e^{-2(t-1)}u(t-1)$, with initial conditions $y(0^+)=1,y'(0^+)=0$

8.- Ch. 5 Ex. 59: Solve

$$\left.\begin{array}{l} ty''-ty'-y=0 \\ y(0^+)=0,\ \ y'(0^+)=3 \end{array}\right\}.$$

9.- Ch. 5 Ex. 61: Solve the IVP

$$y''+y+\int_0^x e^{2(x-t)}\,y'(t)\,dt-\int_0^x (x-t)y''(t)\,dt=e^{2x}$$

with $y(0^+)=\ 0,\ \ y'(0^+)=0.$

10.- Ch. 5 Ex. 67: Find the intensities $i_1(t)$, $i_2(t)$ that satisfy

$$\left.\begin{array}{l} 200i_1+200i_2+\frac{di_2}{dt}=50 \\ 5i_1+4i_2+1000\int_0^t i_1\,(t)\,dt=1 \end{array}\right\}\quad i_1(0)=i_2(0)=0.$$

11.- Notes EDP Ch. 1 Ex. 1: Solve

$$\left(D_x+D_y+1\right)\left(D_x-D_y\right)z=3x^2+2y-4\ .$$

12.- Notes EDP: The temperature T in a frigorific chamber is given by

$$\frac{\partial T}{\partial t}=\frac{1}{4}\frac{\partial^2 T}{\partial x^2}\ ,\quad t>0\ ,\quad 0<x<10\ .$$

The initial temperature is 20^o and the temperature on two walls are fixed at 0^o, i.e.

$$T(0,t)=0\ ,\quad T(10,t)=0\ ,$$

$$T(x,0)=20\ .$$

Find T in the centre of the fridge. What will be the value of T in the centre of the frigorific chamber at $t=2$?