Home Work 5

(1) calculate Laplace's Transform of the following function.

(a) $f(t) = \begin{cases} e^{-3t} & 0 \le t \le 10 \\ 0 & t > 10 \end{cases}$

(b) $f(t) = \begin{cases} 1 & 0 \le t \le 10 \\ 0 & t > 10 \end{cases}$

(c) $f(t) = \begin{cases} e^{-9(t-1)} & 1 \le t \le 10 \\ 0 & t > 10 \\ 0 & t < 1 \end{cases}$

Note: All functions are 0 when $t \le 0$

(2) Calculate the Laplace's Transform of the following function.

(a) $f(t) = \sin 10t$

(b) $f(t) = \cos 10t$

(c) $f(t) = e^{-3t} \sin 10t$

(d) $f(t) = e^{-3t} \cos 10t$.

(3) calculate the Laplace inverse of the following functions

(a) $\frac{3}{s+5}$

(b) $\frac{9}{(s+1)(s+2)}$

(c) $\frac{s}{s^2+16}$

(d) $\frac{5}{s^2+25}$

(e) $\frac{18}{s^4}$

(f) $\frac{s+10}{s^2+100}$

(g) $\frac{3s+4}{s^2+64}$

(4) Using the shifting theorem calculate Laplace inverse of the following functions.

(a) $\dfrac{s-13}{(s-13)^2+25^2}$.

(b) $\dfrac{25}{(s-13)^2+25^2}$.

(c) $\dfrac{s+12}{(s-13)^2+25^2}$.

(5) By completing the square and shifting theorem calculate Laplace inverse of the following functions

(a) $$\frac{3s+4}{s^2+8s+25}$$

(b) calculate

$$\mathcal{L}^{-1}\frac{3s+4}{s^2+8s-25}$$