Lista 11 – Cálculo 2

1) Determine a transformada de Laplace de $f(t)$, usando a definição e a propriedade de linearidade.

a) $f(t)=\begin{cases} k, & 0\le t<c \\ 0, & t\ge c \end{cases}$; Resp. $\frac{k}{s}(1-e^{-cs})$

b) $f(t)=\begin{cases} 0, & 0\le t<2 \\ t, & t\ge 2 \end{cases}$; Resp. $e^{-2s}(\frac{2}{s}+\frac{1}{s^2}),\ s>0$

c) $f(t)=\begin{cases} t & 0\le t<1 \\ 0, & t\ge 1 \end{cases}$; Resp. $\frac{-e^{-s}}{s}+\frac{1}{s^2}(1-e^{-s})$

d) $f(t)=a\cos\frac{t}{\sqrt{2}}$; Resp. $\frac{2as}{2s^2+1},\ s>0$

e) $f(t)=sen(at+b)$; Resp. $\frac{a}{s^2+a^2}\cos b+\frac{s}{s^2+a^2}senb,\ s>0$

f) $f(t)=2sent\cos t$; Resp. $\frac{2}{s^2+4},\ s>0$

g) $f(t)=sen^2t$; Resp. $\frac{2}{s(s^2+4)},\ s>0$

h) $f(t)=senh(at)$; Resp. $\frac{a}{s^2-a^2},\ s>|a|$

i) $f(t)=senkt\cos lt$; Resp. $\frac{1}{2}[\frac{k-l}{s^2+(k-l)^2}+\frac{k+l}{s^2+(k+l)^2}]$

2) Calcule a transformada inversa de Laplace de $F(s)$.

a) $F(s)=\frac{a}{s}+\frac{b}{s^2}+\frac{c}{s^7}$; Resp. $a+bt+\frac{ct^6}{6!}$

b) $F(s)=\frac{\sqrt{3}}{s^2+a^2}$; Resp. $\frac{\sqrt{3}}{a}sen(at)$

c) $F(s)=\frac{1}{(s-a)(s-b)},\ a\ne b$; Resp. $\frac{1}{(a-b)}(e^{at}-e^{bt})$

d) $F(s)=\frac{4s}{4s^2+1}$; Resp. $\cos\frac{t}{2}$

e) $F(s)=\frac{s}{s^2+2s-3}$. Resp. $\frac{1}{4}e^{t}+\frac{3}{4}e^{-3t}$