

Answer on Question #44725 – Math - Other

Determine the poles and zeros for the function:

$F(s)=400(s+10)/(s^2+25s)(s^2+10s+125)$. Hence, find $f(t)$.

Answer.

$$F(s) = \frac{400(s + 10)}{(s^2 + 25s)(s^2 + 10s + 125)}$$

$$F(s) = \frac{400(s + 10)}{s(s + 25)(s + 5 + 10i)(s + 5 - 10i)}$$

So, there is one zero of $F(s)$: $s = -10$,

and 4 poles: $s = 0$, $s = -25$, $s = -5 - 10i$, $s = -5 + 10i$.

Hence:

$$F(s) = \frac{800}{625s} + \frac{1200}{2500(s + 25)} - \frac{400(11s + 35)}{2500(s^2 + 10s + 125)}$$

And

$$f(t) = \frac{32}{25} + \frac{12e^{-25t}}{25} - 2 \frac{(11 + 2i)e^{(-5+10i)t} + (11 - 2i)e^{(-5-10i)t}}{25} =$$
$$= \frac{1}{25} [32 + 12e^{-25t} - 2(11 + 2i)e^{(-5+10i)t} - 2(11 - 2i)e^{(-5-10i)t}].$$