

# Engineering Mathematics

Quiz 3, Fall 2014/12/01

請詳細列出計算過程，如用到公式，請列出公式的通式。請記得在答案卷上簽名。

1.  $f(t) = e^{at}, a \in \text{const}$  求 laplace transform

Ans:

$$F(s) = L\{f(t)\} = \frac{1}{s-a}$$

2.  $f(t) = \cos at = \frac{e^{iat} + e^{-iat}}{2}$  , 求 laplace transform

Ans:

$$F(s) = L\{f(t)\} = \frac{s}{s^2 + a^2}$$

3. Find the given inverse tarsnfrom :  $\mathcal{L}^{-1}\left\{\frac{s}{(s+2)(s^2+4)}\right\}$

Ans:

$$\mathcal{L}^{-1}\left\{\frac{s}{(s+2)(s^2+4)}\right\} = \frac{-1}{4}e^{-2t} + \frac{1}{4}\cos 2t + \frac{1}{4}\sin 2t$$

4.  $F(s) = \mathcal{L}\{f(t)\}$  證明  $\mathcal{L}\{tf(t)\} = -\frac{d}{ds}F(s)$

Ans:

參考投影片 EM\_11th-Week\_MT

5.  $\mathcal{L}\left\{e^{2t} \int_0^t e^{3t}(t)(\sin t)dt\right\}$

Ans:

$$\mathcal{L}\left\{e^{2t} \int_0^t e^{3t}(t)(\sin t)dt\right\} = \frac{2s-10}{(s-2)(s^2-10s+26)^2}$$