

$$f(t) * g(t) = \int_0^t f(t-v)g(v) dv$$

$$\mathcal{L}\{f(t)\} = \int_0^{\infty} e^{-st} f(t) dt$$

$$\mathcal{L}\{f(t) * g(t)\} = F(s)G(s)$$

Laplace Marathon

(great for differential equations students)

Video: https://youtu.be/ftnpM_R00Jc

©blackpenredpen $\int_0^{\infty} e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$
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$$\mathcal{L}\{t^n f(t)\} = (-1)^n \frac{d^n}{ds^n} (F(s))$$

$$\int_0^{\infty} e^{-t} \ln t dt = -\gamma \quad \int_{-\infty}^{\infty} \sin(e^x) dx = \frac{\pi}{2}$$

- (Q1.) $\mathcal{L}\{e^{at}\}$
- (Q2.) $\mathcal{L}\{t^n\}$
- (Q3.) $\mathcal{L}\{\sin(bt)\}$
- (Q4.) $\mathcal{L}\{\cos(bt)\}$
- (Q5.) $\mathcal{L}\{\sinh(bt)\}$
- (Q6.) $\mathcal{L}\{\cosh(bt)\}$
- (Q7.) $\mathcal{L}\{\mathcal{U}(t-a)\}$
- (Q8.) $\mathcal{L}\{\Pi_{a,b}(t)\}$
- (Q9.) $\mathcal{L}\{\delta(t-a)\}$
- (Q10.) $\mathcal{L}\{f(t-a)\mathcal{U}(t-a)\}$ vs. $\mathcal{L}\{f(t)\mathcal{U}(t-a)\}$
- (Q11.) $\mathcal{L}\{(t-2)^2\mathcal{U}(t-2)\}$ vs. $\mathcal{L}\{t^2\mathcal{U}(t-2)\}$
- (Q12.) $\mathcal{L}\{f(at)\}$
- (Q13.) $\mathcal{L}\{e^{at}f(t)\}$
- (Q14.) $\mathcal{L}\{t^3e^{2t}\}$
- (Q15.) $\mathcal{L}\{tf(t)\}$ vs. $\mathcal{L}\{t^n f(t)\}$
- (Q16.) $\mathcal{L}\{t\sin(bt)\}$
- (Q17.) $\mathcal{L}\left\{\frac{f(t)}{t}\right\}$
- (Q18.) $\mathcal{L}\left\{\frac{\sin t}{t}\right\}$
- (Q19.) $\mathcal{L}\{f'(t)\}$
- (Q20.) $\mathcal{L}\{f''(t)\}$
- (Q21.) $\mathcal{L}\left\{\int_0^t f(v)dv\right\}$
- (Q22.) $\mathcal{L}\{f(t)*g(t)\}$
- (Q23.) $\mathcal{L}\{\sqrt{t}\}$
- (Q24.) $\mathcal{L}\{\ln t\}$