MATH 305
Laplace Transforms
Summary

1. $L\left[f\left(t\right)\right]=\int_{0}^{\infty}e^{-st}f\left(t\right)dt=\hat{f}\left(s\right)$

2. $L\left[k\right]=\dfrac{k}{s}$

3. $L\left[e^{bt}\right]=\dfrac{1}{s-b}$

4. $L\left[c_1f_1\left(t\right)+c_2f_2\left(t\right)\right]=c_1\hat{f}_1\left(s\right)+c_2\hat{f}_2\left(s\right)$

5. $L\left[f\left(at\right)\right]=\dfrac{1}{a}\hat{f}\left(\dfrac{s}{a}\right)$

6. $L\left[f'\left(t\right)\right]=s\hat{f}\left(s\right)-f\left(0\right)$

7. $L\left[f''\left(t\right)\right]=s^2\hat{f}\left(s\right)-sf\left(0\right)-f'\left(0\right)$

8. $L\left[\sin\left(\omega t\right)\right]=\dfrac{\omega}{s^2+\omega^2}$

9. $L\left[\cos\left(\omega t\right)\right]=\dfrac{s}{s^2+\omega^2}$

10. $L\left[t^nf\left(t\right)\right]=\left(-1\right)^n\dfrac{d^n}{ds^n}\hat{f}\left(s\right)$

11. $L\left[t^n\right]=\dfrac{n!}{s^{n+1}},\quad n=0,1,2,\ldots$

12. $L\left[e^{ct}f\left(t\right)\right]=\hat{f}\left(s-c\right)$

13. $L\left[\int_0^t f(t-\tau)\, g(\tau)\, d\tau\right] = L[(f*g)(t)] = \hat{f}(s)\,\hat{g}(s)$

14. $L^{-1}\left[\hat{f}(s)\,\hat{g}(s)\right] = (f*g)(t)$

15. $L[H(t-c)\, f(t-c)] = e^{-cs}\hat{f}(s)$

16. Periodic function f with period P : $L[f(t)] = \dfrac{\int_0^P e^{-st} f(t)\, dt}{1-e^{-Ps}}$

17. $L[\delta(t-c)] = e^{-sc}$