ECE 218 SIGNALS AND SYSTEMS LABORATORY 11

***Do following transformations in matlab**

Laplace Transforms

1. $f(t) = 1$
   - $F(s) = \frac{1}{s}$
2. $f(t) = e^{-at}$
   - $F(s) = \frac{1}{s+a}$
3. $f(t) = u(t)$
   - $F(s) = \frac{1}{s}$
4. $f(t) = \delta(t)$
   - $F(s) = 1$
5. $f(t) = \sin(\omega t)$
   - $F(s) = \frac{\omega}{s^2+\omega^2}$
6. $f(t) = \cos(\omega t)$
   - $F(s) = \frac{s}{s^2+\omega^2}$
7. $f(t) = e^{at}$
   - $F(s) = \frac{1}{s-a}$
8. $f(t) = t$
   - $F(s) = \frac{1}{s^2}$
9. $f(t) = u(t-a)$
   - $F(s) = \frac{e^{-as}}{s}$
10. $f(t) = t^n$
    - $F(s) = \frac{n!}{s^{n+1}}$
11. $f(t) = \sinh(at)$
    - $F(s) = \frac{a}{s^2-a^2}$
12. $f(t) = \cosh(at)$
    - $F(s) = \frac{s}{s^2-a^2}$
13. $f(t) = t^n e^{at}$
    - $F(s) = \frac{n!}{(s-a)^{n+1}}$
14. $f(t) = t^n \sin(\omega t)$
    - $F(s) = \frac{n!\omega}{(s^2+\omega^2)^{n+1}}$
15. $f(t) = t^n \cos(\omega t)$
    - $F(s) = \frac{n!s}{(s^2+\omega^2)^{n+1}}$
16. $f(t) = e^{-at} \sin(\omega t)$
    - $F(s) = \frac{\omega}{(s+a)^2+\omega^2}$
17. $f(t) = e^{-at} \cos(\omega t)$
    - $F(s) = \frac{s+a}{(s+a)^2+\omega^2}$
18. $f(t) = \frac{t^n}{n!}$
    - $F(s) = \frac{1}{s^{n+1}}$
19. $f(t) = e^{at} t^n \sin(\omega t)$
    - $F(s) = \frac{n!\omega}{(s-a)^2+\omega^2}$
20. $f(t) = e^{at} t^n \cos(\omega t)$
    - $F(s) = \frac{n!(s-a)}{(s-a)^2+\omega^2}$

Inverse Laplace Transforms

1. $F(s) = \frac{1}{s}$
   - $f(t) = 1$
2. $F(s) = \frac{1}{s+a}$
   - $f(t) = e^{-at}$
3. $F(s) = \frac{1}{s^2}$
   - $f(t) = t$
4. $F(s) = 1$
   - $f(t) = \delta(t)$
5. $F(s) = \frac{\omega}{s^2+\omega^2}$
   - $f(t) = \sin(\omega t)$
6. $F(s) = \frac{s}{s^2+\omega^2}$
   - $f(t) = \cos(\omega t)$
7. $F(s) = \frac{1}{s-a}$
   - $f(t) = e^{at}$
8. $F(s) = \frac{e^{-as}}{s}$
   - $f(t) = u(t-a)$
9. $F(s) = \frac{1}{(s^2+a^2)^2}$
   - $f(t) = \frac{t\sin(at)}{a}$
10. $F(s) = e^{as}$
    - $f(t) = \delta(t-a)$
11. $F(s) = \frac{1-e^{-as}}{s}$
    - $f(t) = u(t-a)$
12. $F(s) = \frac{2}{s^2+4}$
    - $f(t) = \sin(2t)$
13. $F(s) = \frac{2s}{s^2+4}$
    - $f(t) = \cos(2t)$
14. $F(s) = \frac{1}{(s+a)(s+b)}, a \neq b$
    - $f(t) = \frac{e^{-at}-e^{-bt}}{a-b}$
15. $F(s) = \frac{s}{(s+a)^2}$
    - $f(t) = te^{-at}$
16. $F(s) = \frac{s+a}{s^2-as}, a > 0$
    - $f(t) = (1-e^{-at})u(t)$
17. $F(s) = \frac{2s}{s^2+1}$
    - $f(t) = 2\cos(t)$
18. $F(s) = \frac{s}{s^2+1}$
    - $f(t) = \sin(t)$
19. $F(s) = \frac{1}{(s^2+a^2)^2}$
    - $f(t) = \frac{t\sin(at)}{a}$
20. $F(s) = \frac{s^2+2s+2}{s^3+3s^2+3s+1}$
    - $f(t) = e^{-t} + t^2e^{-t}$