

ENEE 322 Homework Assignments
Oppenheim and Willsky, 2nd edition
Fall 2013

Note: The date shown is the date the problems were assigned. They are due at the beginning of the next discussion section.

1. September 5: 1.21 a,d; 1.22 a,b; 1.24 a
2. September 10: 1.25 b,c; 1.26 (If in doubt, try a MATLAB plot.)
3. September 12: 1.27 a,c,g; 1.30 a,b,c,d
4. September 17: 2.21 all
5. September 19: 2.22 all
6. September 26: 2.28 a,b,c,f; 2.29 a,c,e
7. October 1: 2.40
8. October 3: 2.53 **(c)** (i),(vi); 2.56**(d)**(i); **(f)**(i) Hint: If $x \rightarrow y$, then $dx/dt \rightarrow dy/dt$. Then use superposition.

EXAM 1: Thursday, October 17, Chapters 1 and 2

9. October 10: 2.54(c)i,ii; 2.55(f)i,iii
10. October 10: 2.58 (Note: Input $x_2[n] = \text{output } y_1[n]$. Hint for part (f): Merge two one-sample delay elements into a single two-sample delay element.); 2.60. We did the general case for these problems in class.
11. October 22: Look at the class web site www.ece.umd.edu/~trettter for “Special Homework Assignment for the Response of an IIR Filter to Sine Waves.” Due on Wednesday, November 6 in discussion section.
12. October 24:
 - (a) **3.22(a)**: Fig. P3.22 (d), (e) (Use the “real form” Fourier series for all of these, that is, the series using $a_n, b_n, \cos n\omega_0 t$, and $\sin n\omega_0 t$.)
 - (b) Find the complex exponential Fourier series for the following signals.
 - i. The half-wave rectified sinewave

$$x(t) = \begin{cases} A \cos \omega_c t & \text{for } A \cos \omega_c t > 0 \\ 0 & \text{for } A \cos \omega_c t \leq 0 \end{cases}$$

What is the DC value, x_0 ?

- ii. The full-wave rectified sinewave $x(t) = |A \cos \omega_c t|$.
What is the DC value?
- 13. October 29: (DUE Wednesday, November 6) Use the complex exponential series form for **3.22(a)** (Do not do **3.22(b)**). Just do Figures P3.22 (a) and (c). (Hint: Use the differentiation to an impulse train and integration theorem approach discussed in class to avoid integration by parts.)
- 14. November 5: (Due November 13) 4.21 (a), (b), (c); 4.22 (a), (b), (d)
- 15. November 7: (Due November 13) 4.23, 4.25, 4.31
- 16. November 14: 4.33 (a), (b); 4.34; 4.36 (Use the Fourier and inverse Fourier transforms to solve these problems)
- 17. November 19: (Due November 27) 9.21 a,b,c,g,i,j
- 18. November 26: (Due Wednesday, December 4): **Homework Problem Set on Inverse Laplace Transforms**

(a) Assume all signals are causal. Find the time signals corresponding to the following Laplace transforms:

- i. $\frac{s}{s^2 + 3s + 2}$
- ii. $\frac{2}{s^2 + 2s + 5}$
- iii. $\frac{3s + 4}{s^2 + 2s + 5}$
- iv. $\frac{1}{s^2(s + 1)}$
- v. $\frac{s^2}{(s + 1)(s + 2)}$

(b) Solve the following differential equation for $t \geq 0^-$ by Laplace transform methods.

$$\frac{d^2}{dt^2}y(t) + 5\frac{d}{dt}y(t) + 6y(t) = x(t)$$

where $x(t)$ is a unit step function, $y(0^-) = -1$, and $\dot{y}(0^-) = 1$.

- 19. December 6: 10.21 (a), (c), (d), (f), (g) (Ignore the question about the existence of the Fourier transform); 10.25 (a)
- 20. December 10: 10.33; 10.39 Just do for $H_1(z)$ (a), (b) (If you get tired of playing in the snow, work on these interesting problems.)

FINAL EXAM: Thursday, December 19, 10:30 am – 12:30 pm