

Homework # 2
Due Thursday January 30th

1. Chapter 2 in the book, problems 1,6,7,15,16
2. The Limulus spatio-temporal transfer function can be written as

$$R(x, t) = \int_0^{\infty} d\tau D(\tau) \int_{-\infty}^{\infty} dy J(x - y)S(y, t - \tau),$$

where we will use

$$J(x) = Aae^{-a|x|} - Bbe^{-b|x|}.$$

and

$$D(t) = Cce^{-ct} - Dde^{-dt}.$$

- (a) Compute the steadystate response to a spatial step function, $S(x) = S_0$ for $x < 0$ and $S(x) = S_1 > S_0$ for $x \geq 0$. Plot the response function using $A = 2, B = 2, a = 1, b = .25, C = 2, D = 1$.
- (b) Compute the steady state output to $S(x) = \cos kx$. Is there a preferred spatial frequency, k .
- (c) Compute the temporal response to $\cos(\omega t)$. Is there a preferred temporal frequency? Use $D = C = 1, c = 1, d = .2$ and plot the amplitude as a function of frequency.