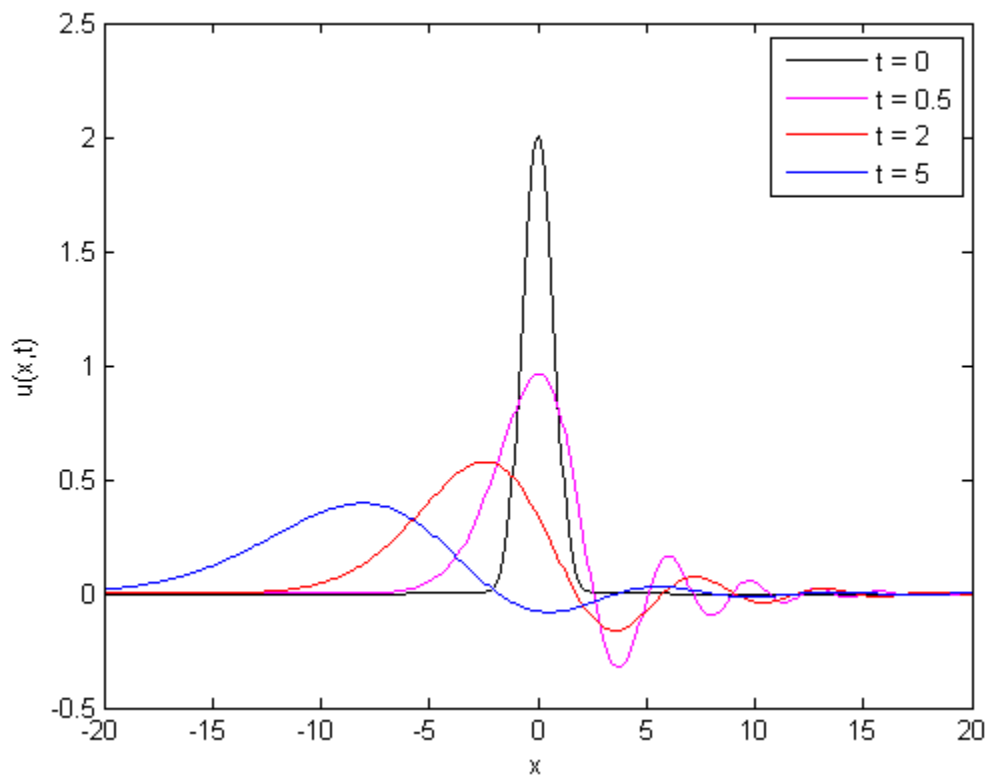Solutions

Prob 1

$$u(x,t) = \frac{1}{\sqrt{\pi}} \int_0^\infty e^{-(\omega^2/4+\omega^2 t)} \cos(\omega x + 2\omega t - 2\omega^3 t)\, d\omega$$

The integration can be carried out numerically.

Plot:

Prob 2

$$u(x,t) = 2\int_0^\infty Re[U(\omega,t)e^{i\omega x}]d\omega \ ,$$

where

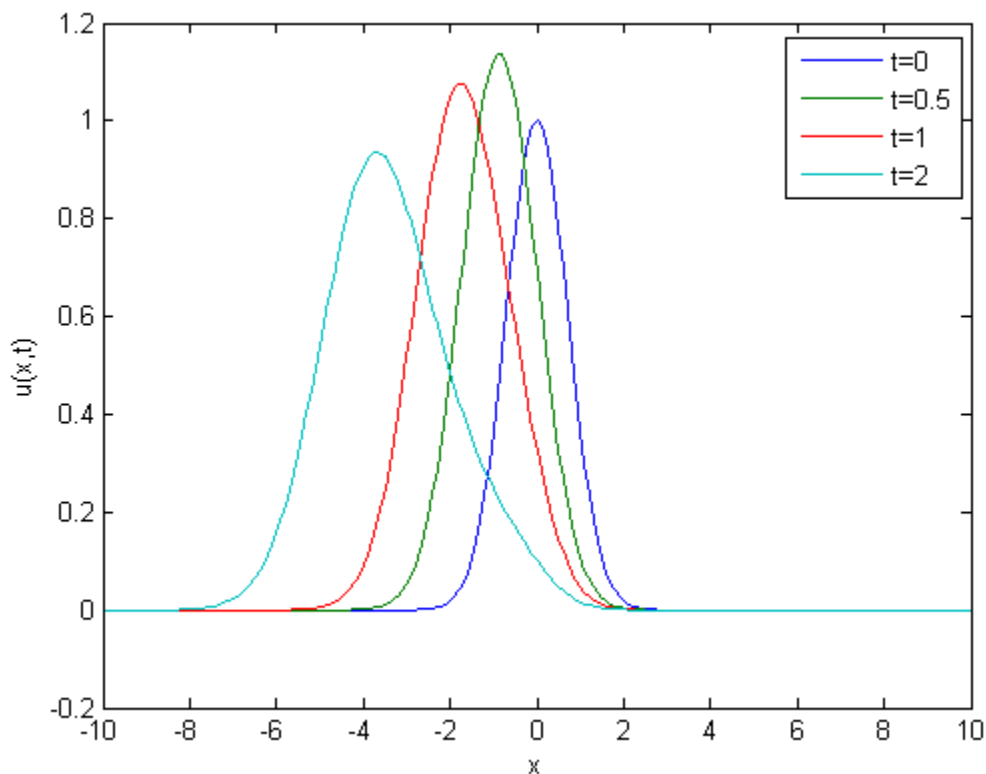$$U(\omega,t) = \frac{e^{-\omega^2/4+\alpha(\omega)t}}{2\sqrt{\pi}}\ [1+\frac{1-e^{-(1+\alpha(\omega))t}}{1+\alpha(\omega)}] \ ,$$

and

$$\alpha(\omega) \equiv i2\omega - 0.2\omega^2 \ .$$

The integration can be carried out numerically.

Plot:

Prob 3

$$u(x,t) = e^{-(x+5t)^2 - t^2/2}$$

Needs to solve the problem using the <u>Fourier transform method</u> with correct procedure to receive credit.