

Prob 1

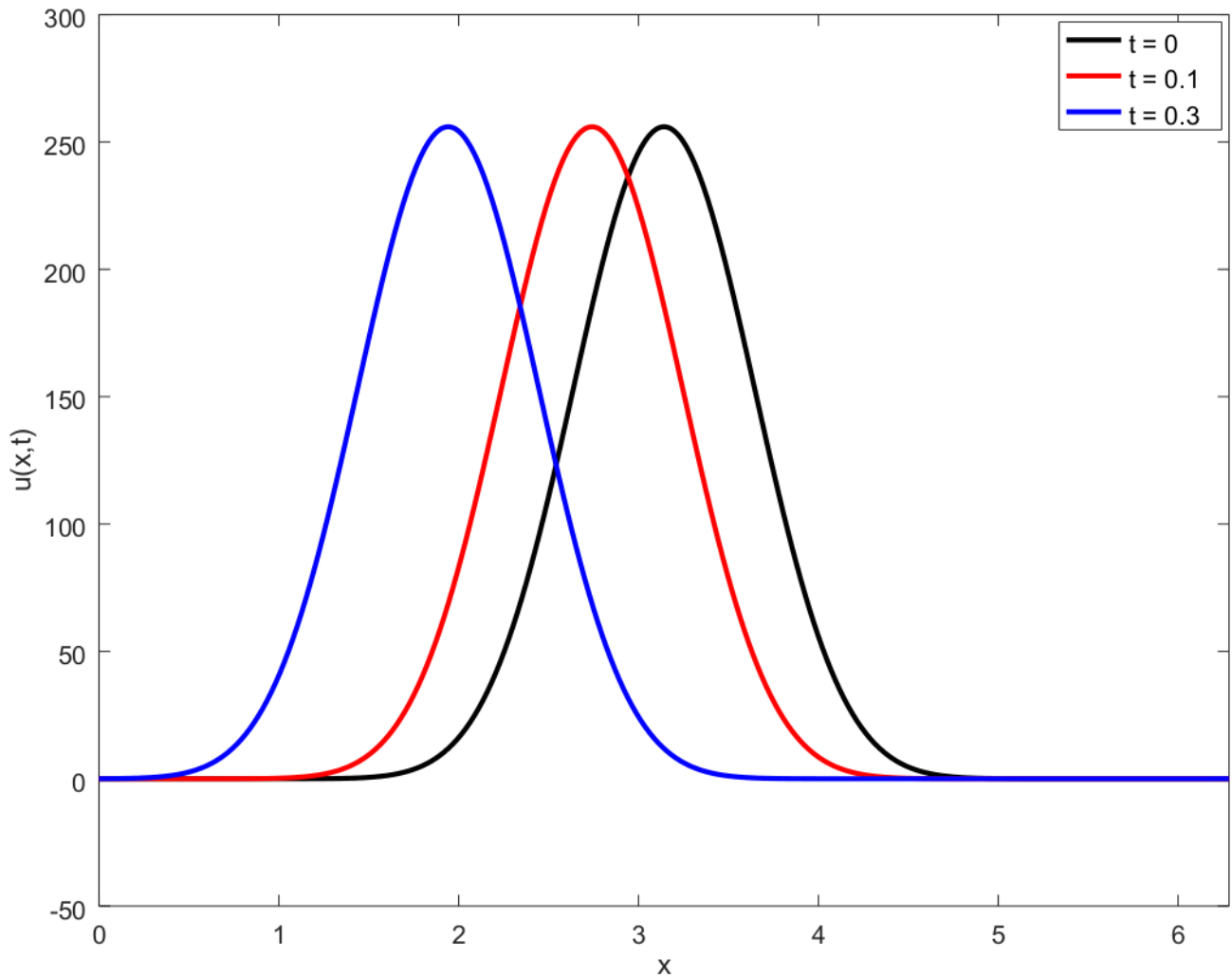
$$u(x, t) = \sum_{n=-\infty}^{\infty} C_n(0) e^{i(nx + (An - Dn^3)t)} e^{-Bn^2 t},$$

where

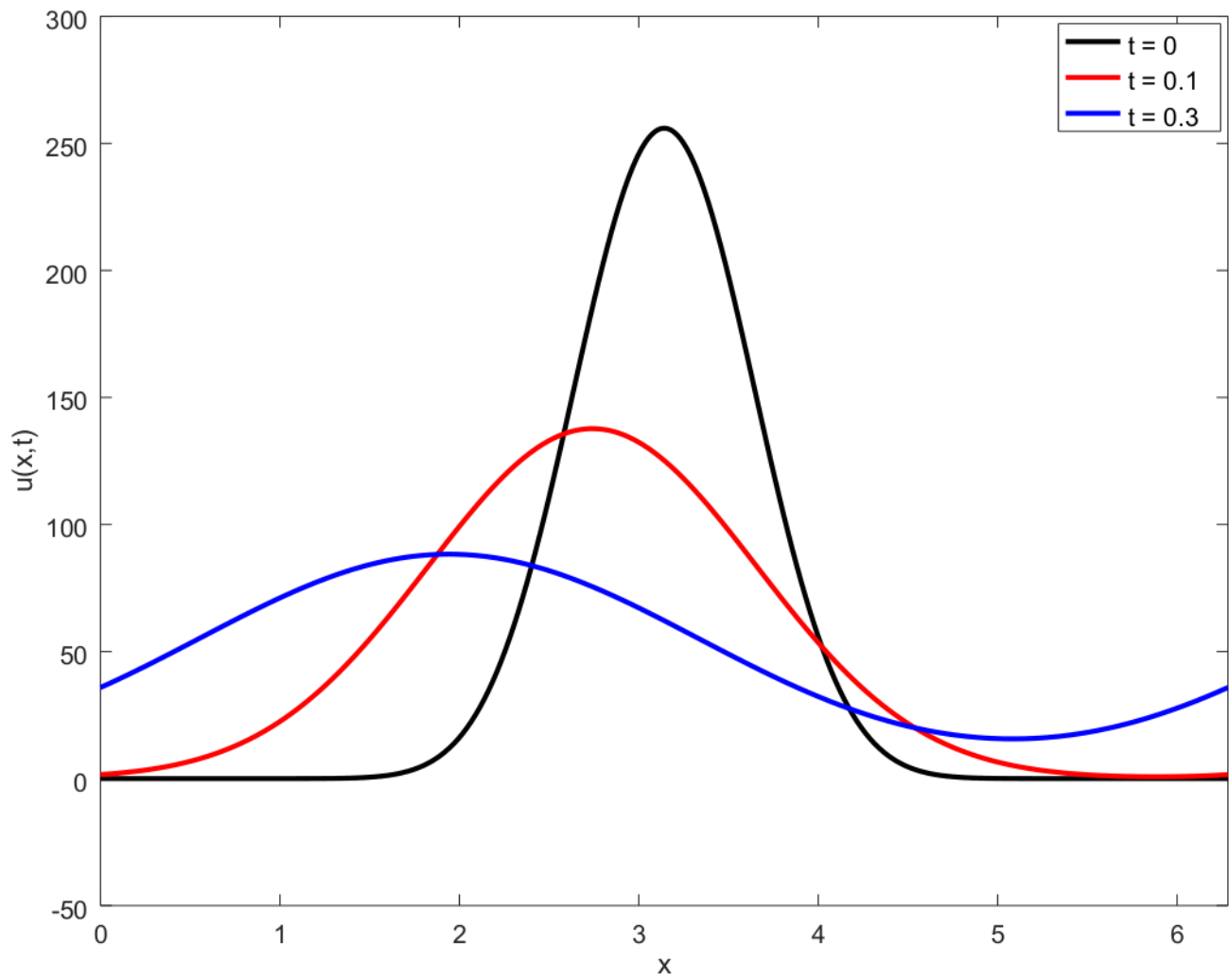
$$C_n(0) = \frac{1}{2\pi} \int_0^{2\pi} [1 - \cos(x)]^8 e^{-inx} dx,$$

and for the three cases we have (I)  $A = 4, B = D = 0$ ; (II)  $A = 4, B = 3, D = 0$ ; (III)  $A = B = 0, D = 0.3$ .

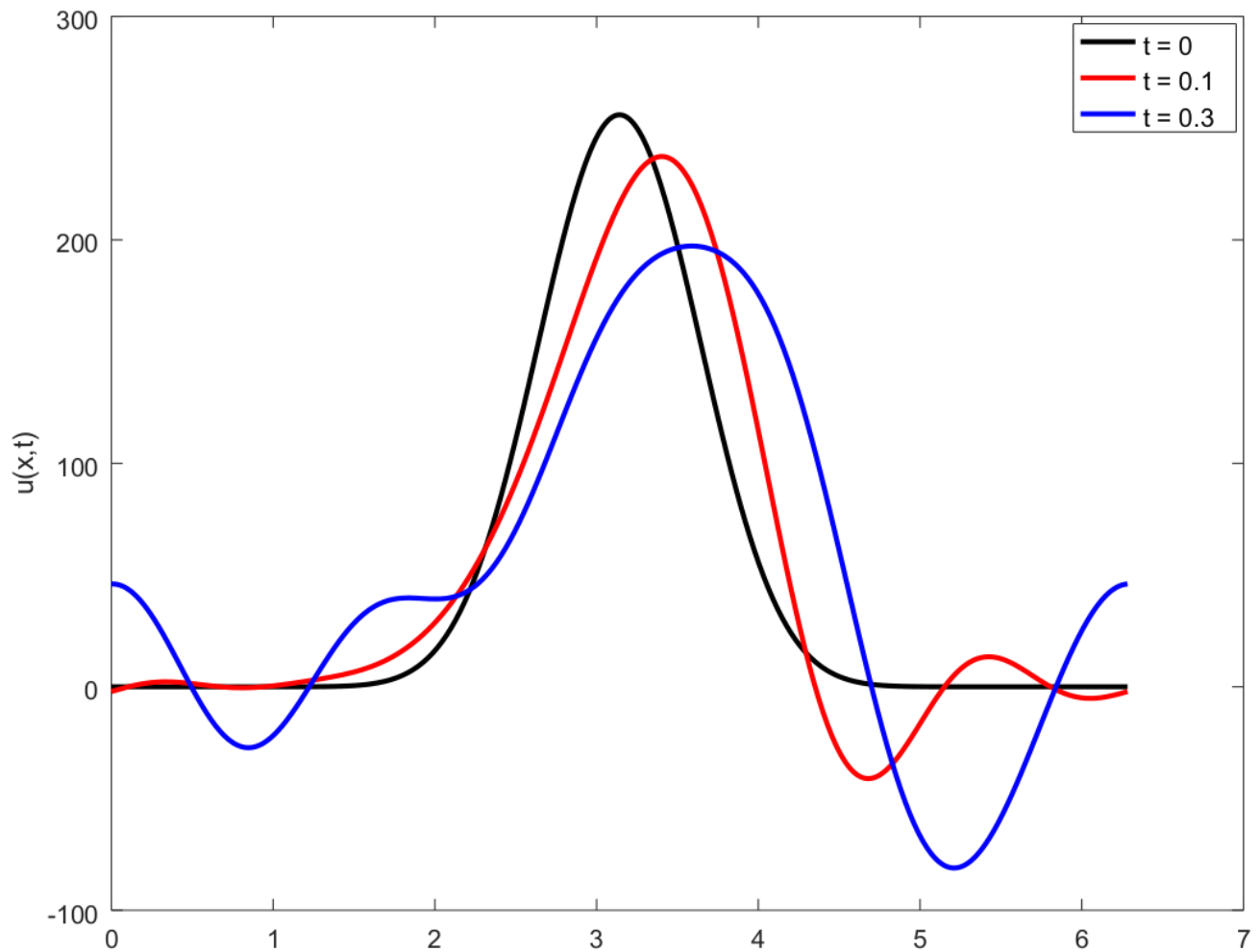
Plot for (I):



Plot for (II):



Plot for (III):



Prob 2

$$u(x, t) = e^{t+t^2/2} + \cos(x-t-t^2/2) + 3 \sin(x-t-t^2/2)$$

Prob 3

$$u(x, t) = 3 + \left[ \left(1 - \frac{1}{\pi^2}\right) e^{-(\pi^2+1)t} + \frac{1}{\pi^2} e^{-t} \right] \cos(\pi x) + e^{-(4\pi^2+1)t} \cos(2\pi x)$$

Prob 4

$$u(x, t) = 1 - \cos(t) + t \cos(x)$$

Prob 5

$$u(x, t) = 2t + t^2/2 + \left[ \frac{1 - e^{-\pi^2 t}}{\pi^2} \right] \cos(\pi x) + x^2 + x$$