Prob 1

$$u(x, t) = 1 \quad , \quad \text{if } x \le 1.5\, t$$

$$= 1 + \left(\frac{-1+\sqrt{1-6\,t^2+4\,x\,t}}{2\,t}\right)^2 \quad , \quad \text{if } 1.5\, t < x \le 1 + 2.5\, t$$

$$= 2 \quad , \quad \text{if } x > 1 + 2.5\, t$$

Plot:
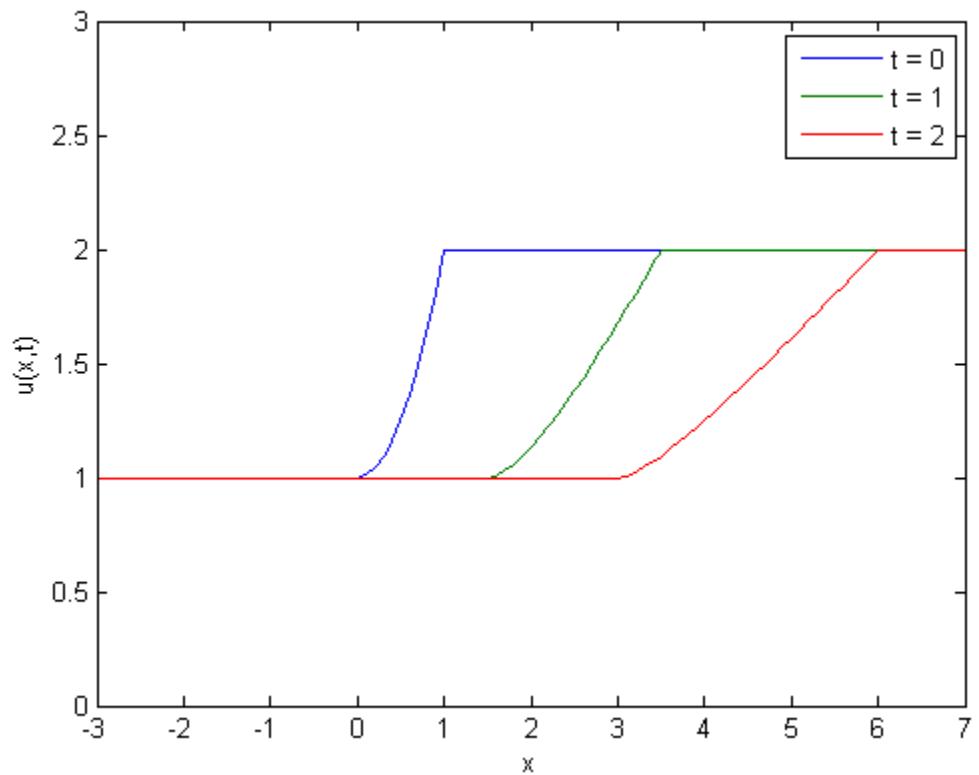
Prob 2

$$u(x,t) = 1 - x(1 - e^{-2t}) \ , \ \ \textit{if } x < 0$$

$$= e^{-(xe^{-2t})} - x(1 - e^{-2t}) \ , \ \ \textit{if } x \geq 0$$

$u(1, 0.1) = 0.2597 \ , \qquad u(-1, 0.2) = 1.3297$

Prob 3

$$G(t,t') = e^{5(t-t')} \ .$$

$$u(x,t) = e^{-x^2 + 5t} + \frac{1}{8}(e^{5t} - e^{-3t})$$