ME5240 Programming Home Work No. 1

Consider the non-linear Burger's equation

$$\frac{\partial u}{\partial t} + u\frac{\partial u}{\partial x} = 0 \qquad where \qquad -\infty \le x \le \infty \qquad and \qquad t \ge 0$$

with the following initial condition

$$u(x, 0) = f(x)$$

where

$$\begin{aligned} f(x) &= u_0 + A \bullet \sin(x) \qquad for \qquad 0 \le x \le 2\pi \\ &= u_0 \qquad\qquad\qquad\qquad otherwise \end{aligned}$$

It can be shown that the exact solution to this problem is

$$u = f(x - ut)$$

Use u_0 = 1.0 and A = 1.0 to find u at t = 0.5, 1.0, 1.5, 2.0, 3.0, 4.0, 6.0, 8.0, and 10.0.