

# MA473: Computational Finance

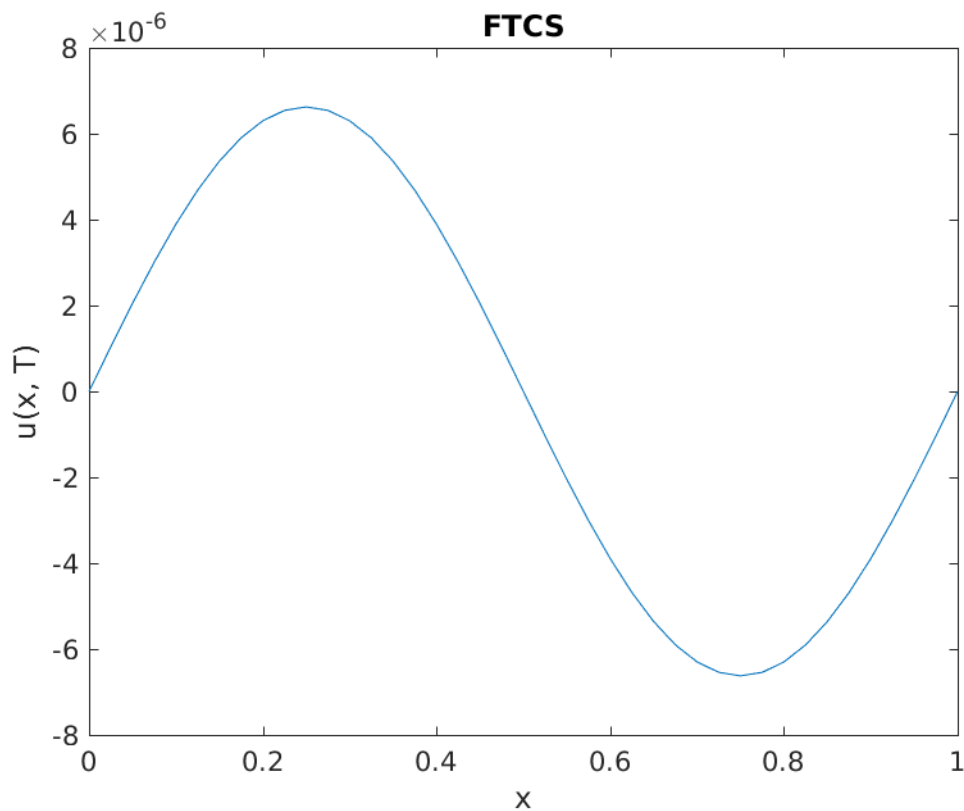
Lab 01 Report

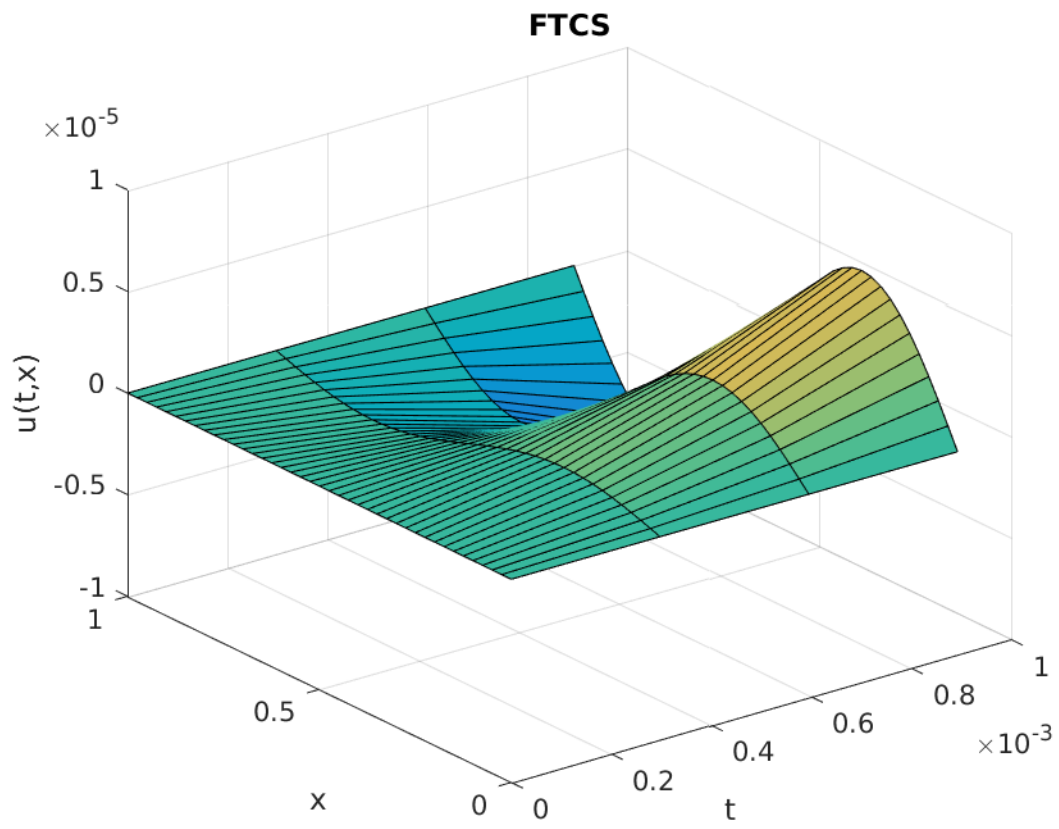
Abheek Ghosh - 140123047

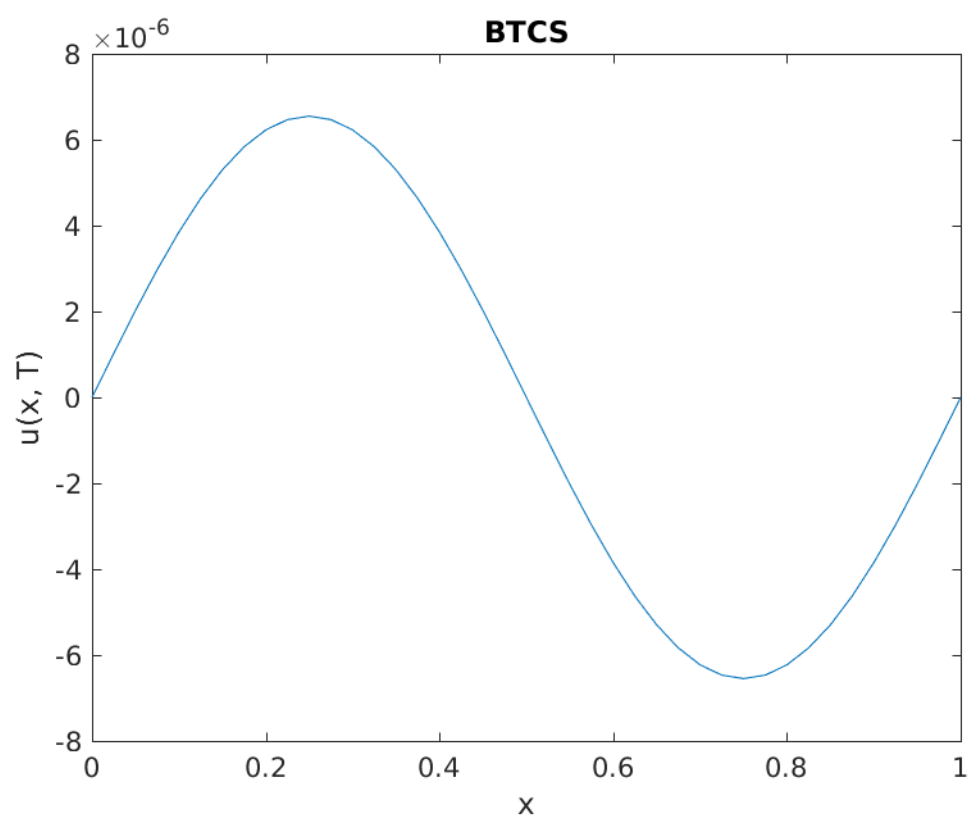
January 12, 2018

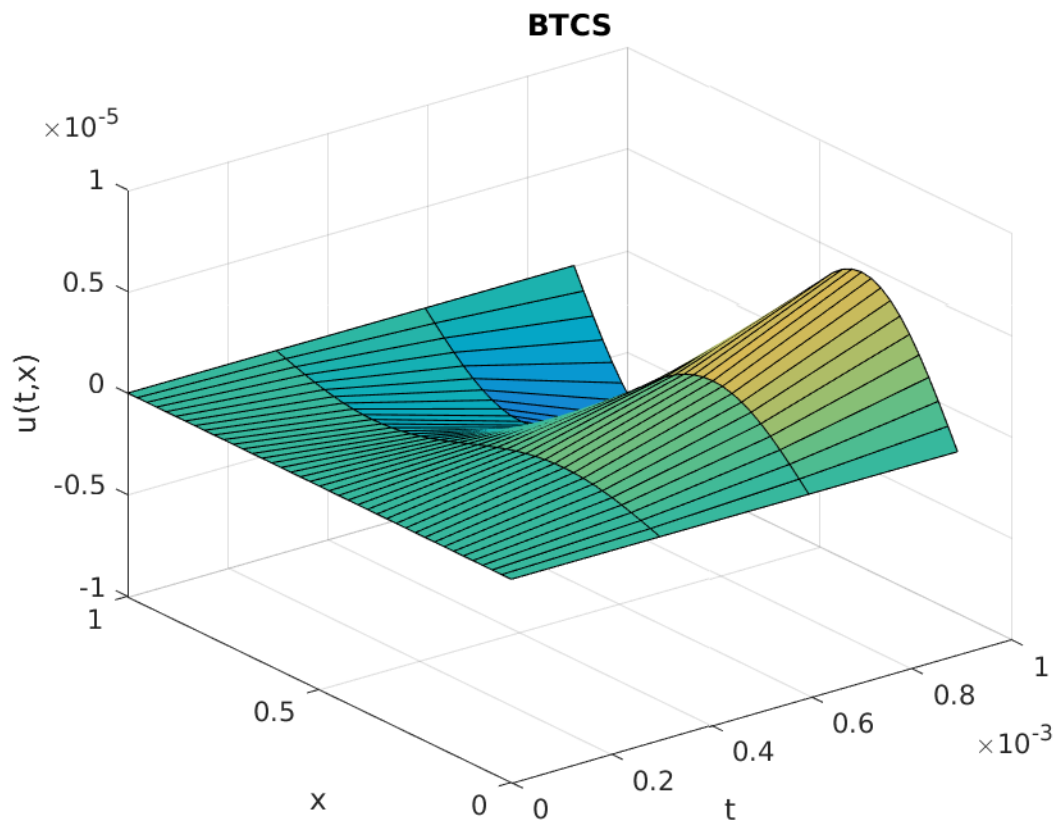
When there are  $N$  time points  $t$  and  $M$  space points  $x$ , the time complexity of FTCS is  $O(NM)$ . Assuming that the *backslash* solver of Matlab takes  $O(M^3)$  time for a matrix of size  $M \times M$ , the BTCS method takes  $O(NM^3)$ . Same  $O(NM^3)$  time for Crank-Nicolson.

## Question 1





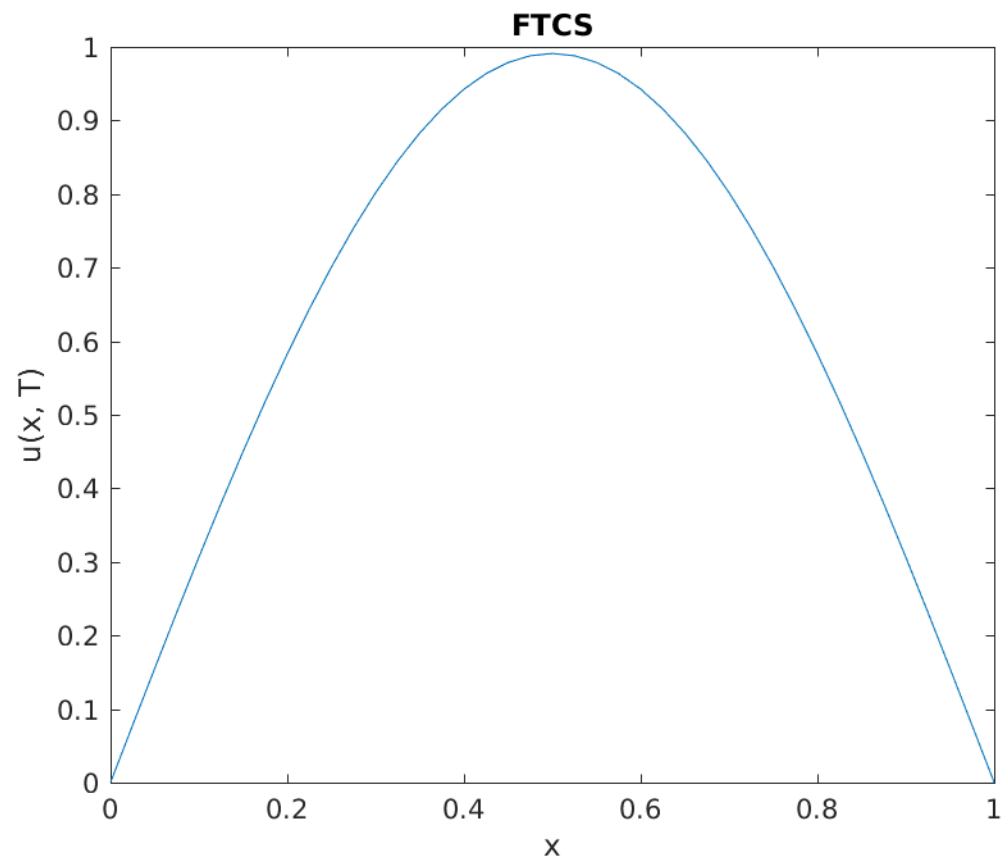


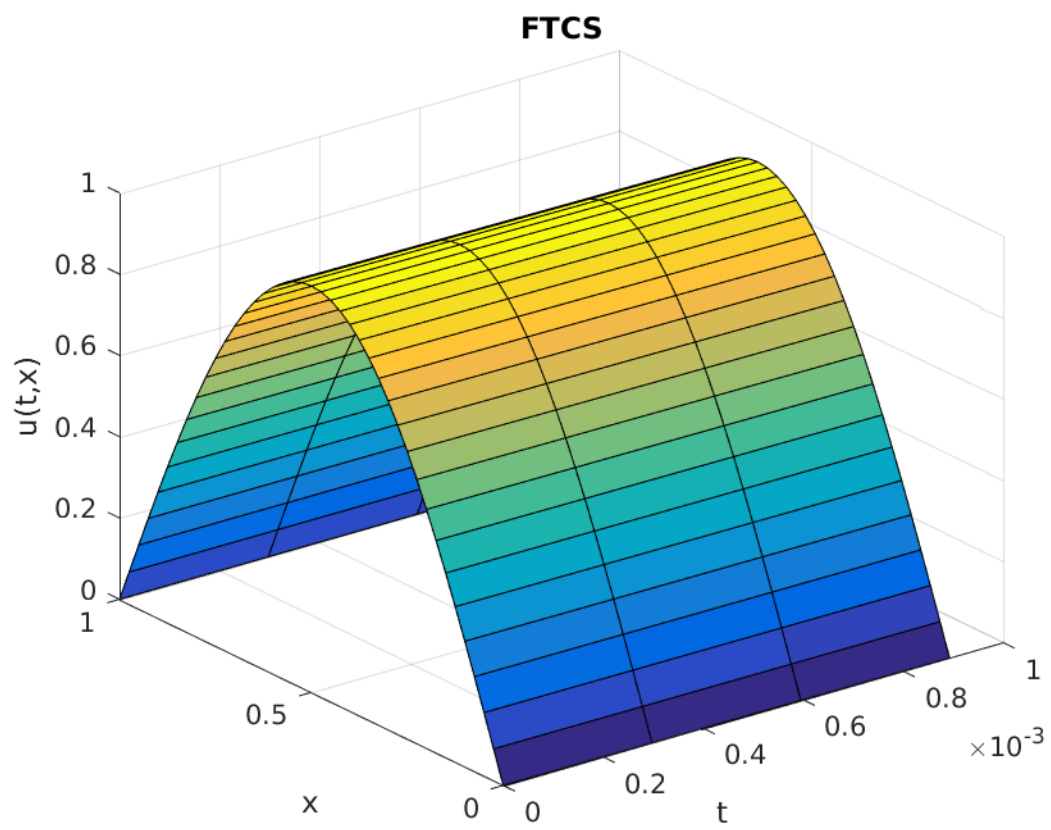


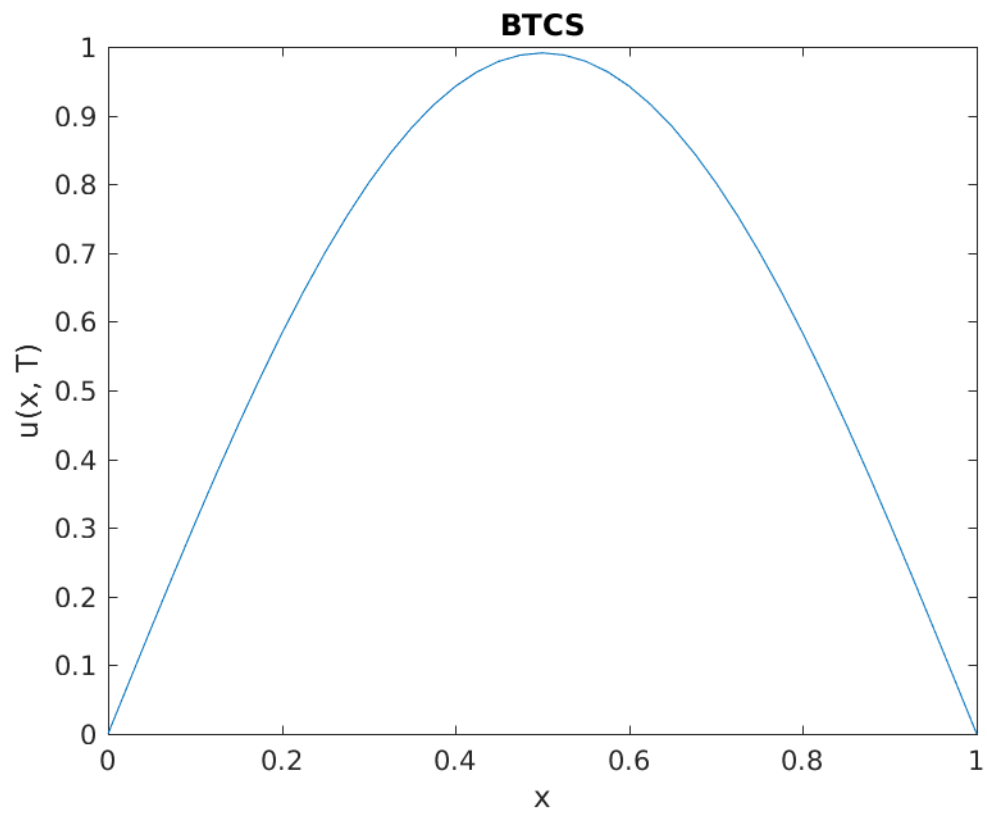
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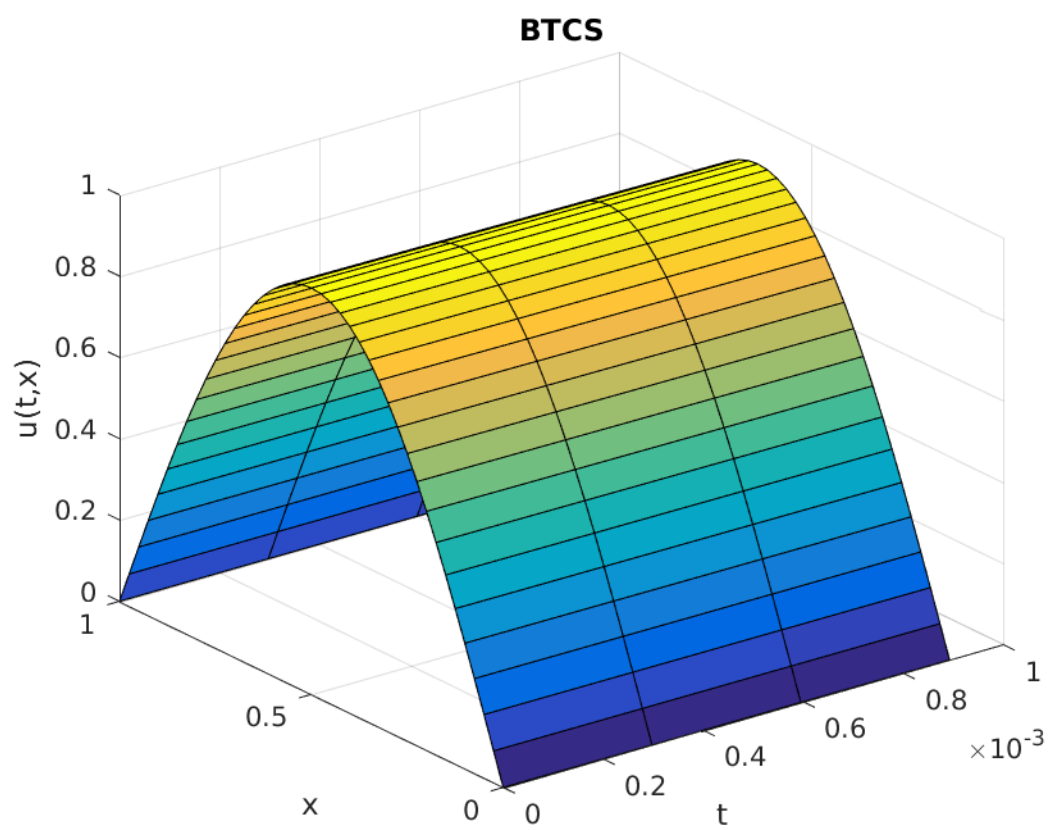
## Question 2

$$(a) f(x) = \sin(\pi x)$$

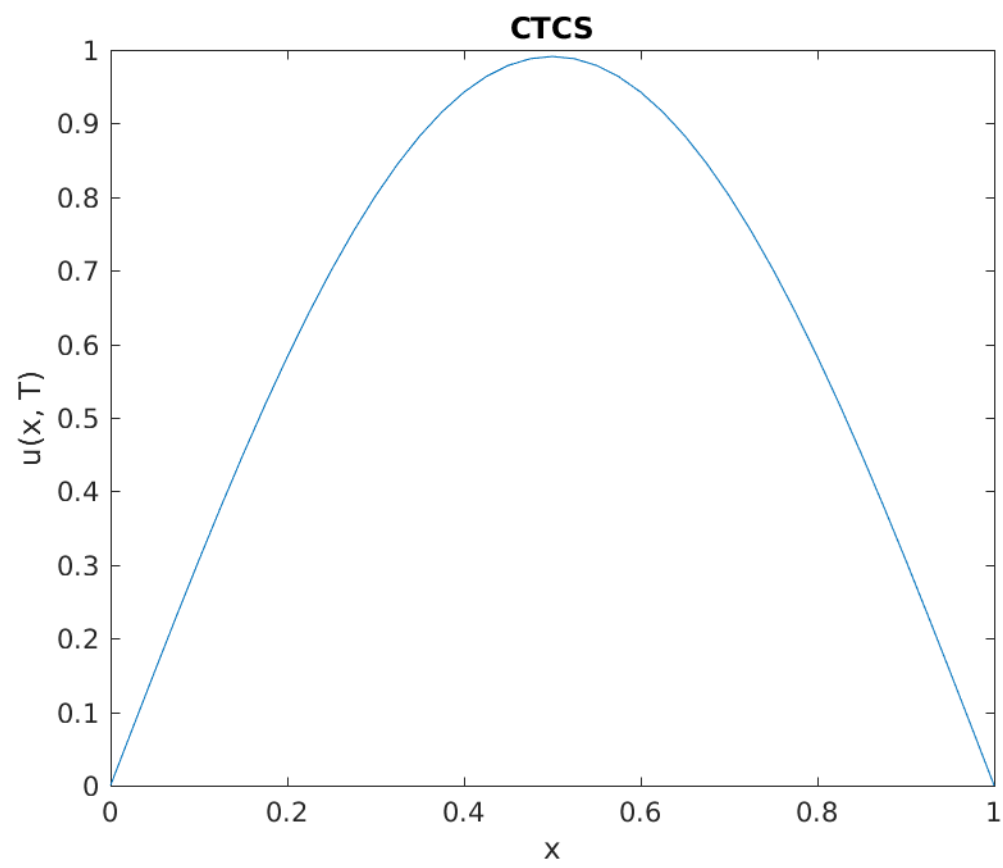


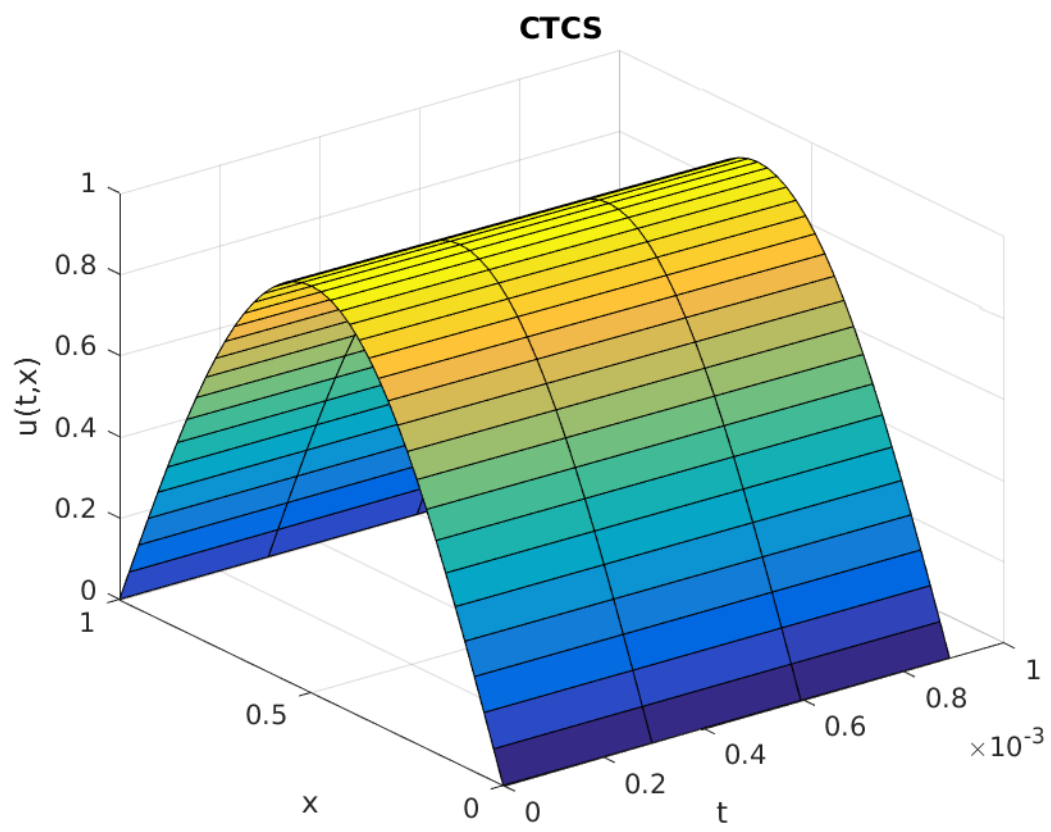






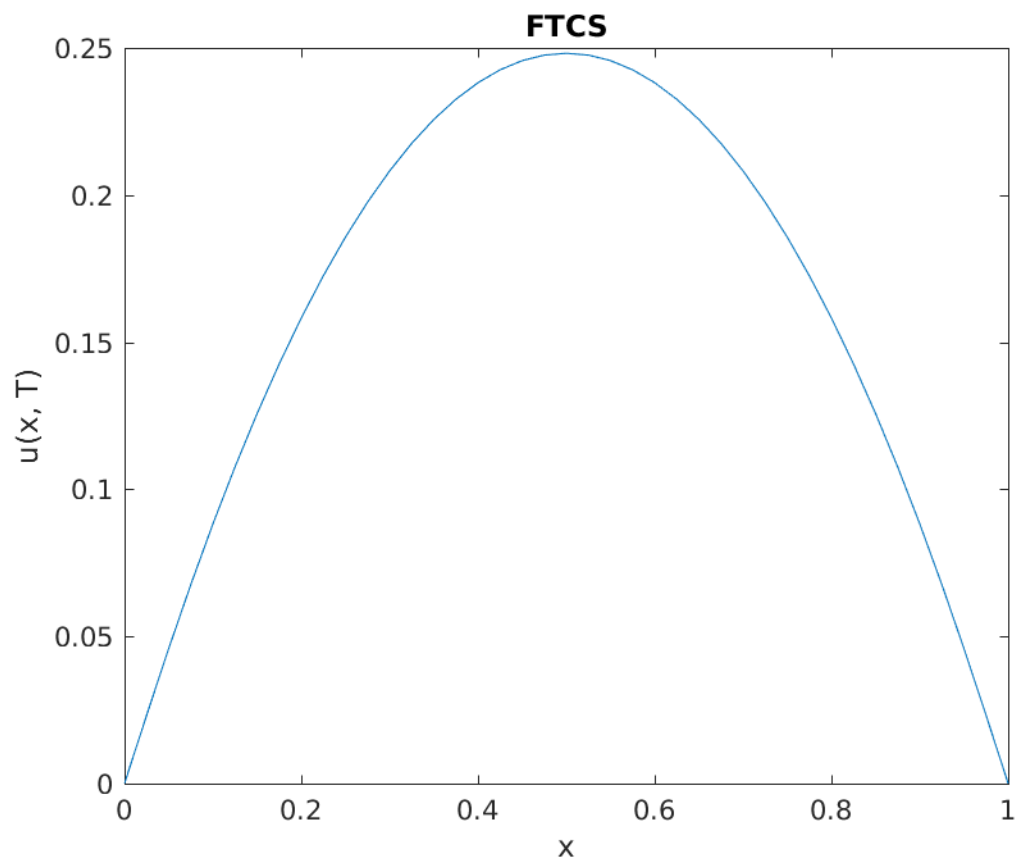


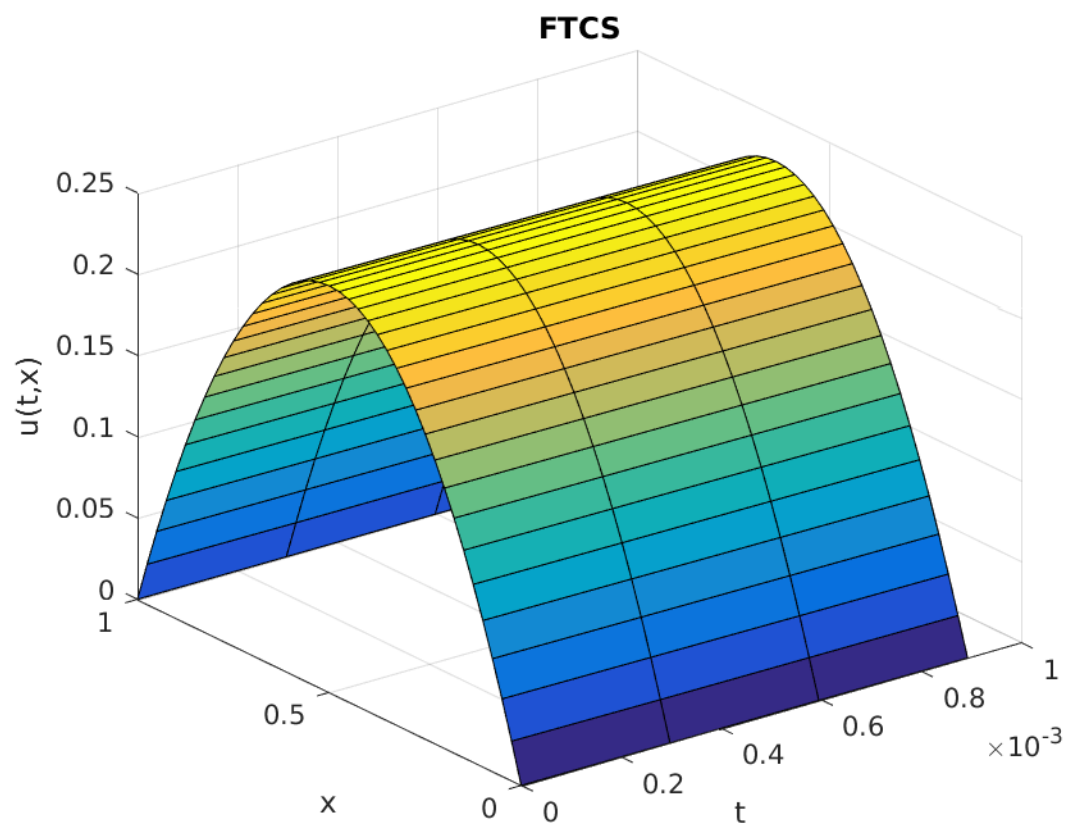


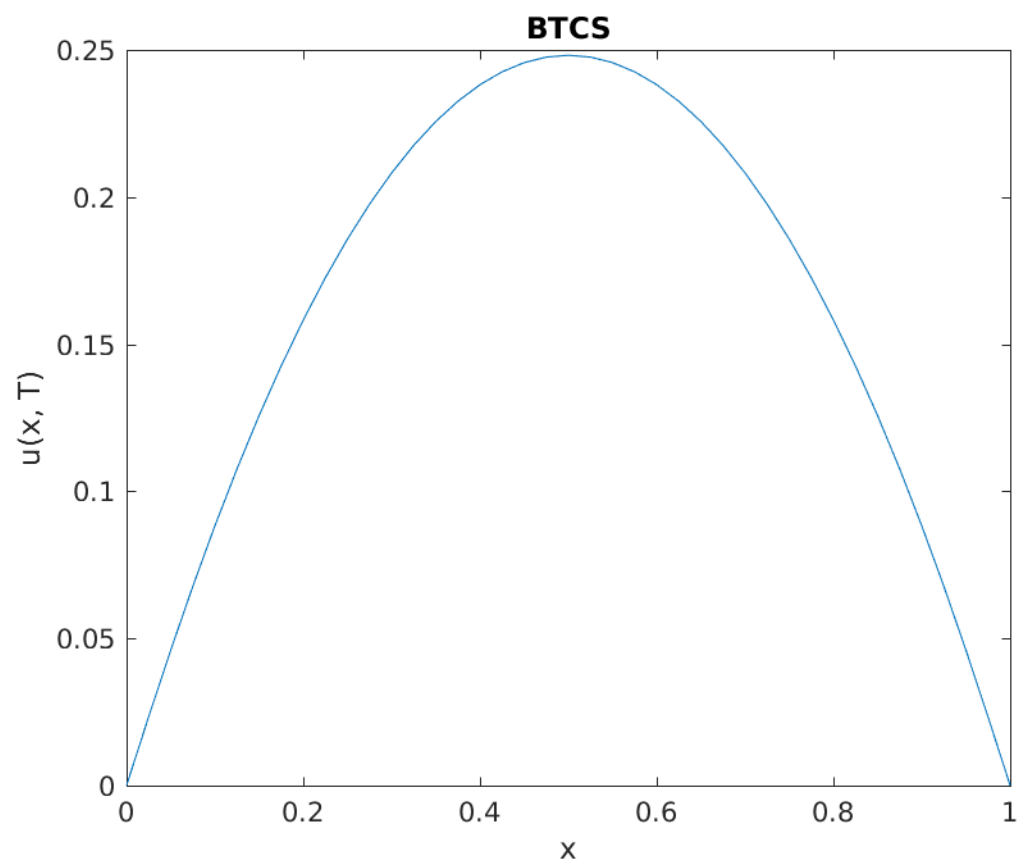


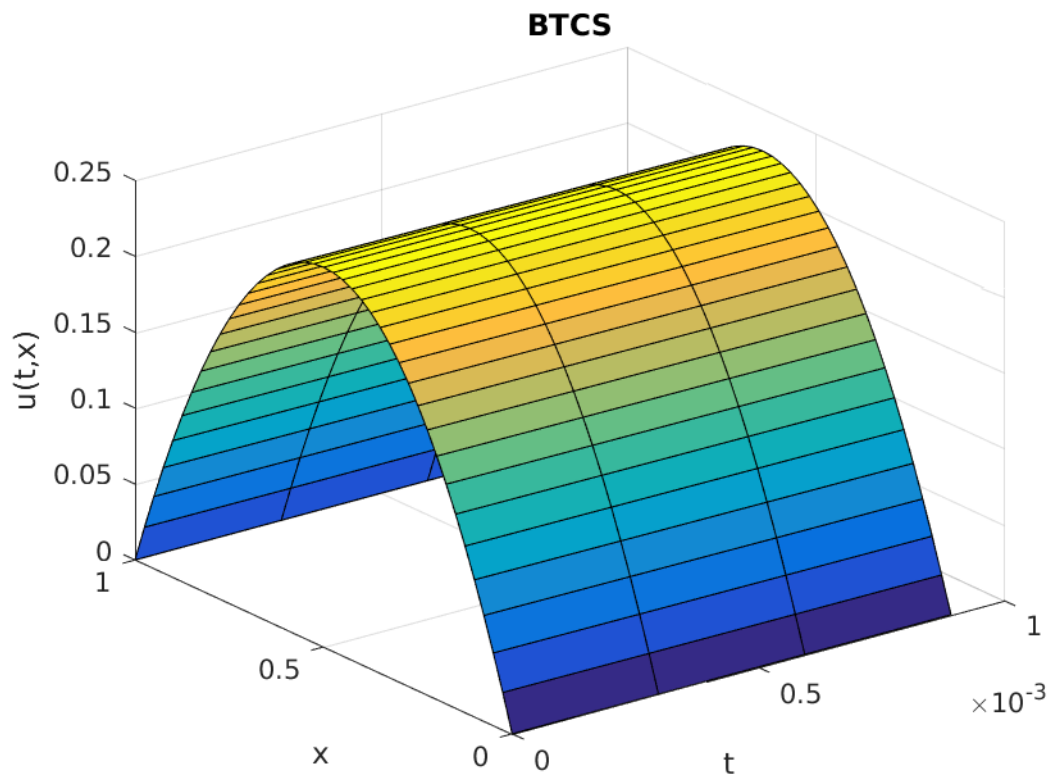
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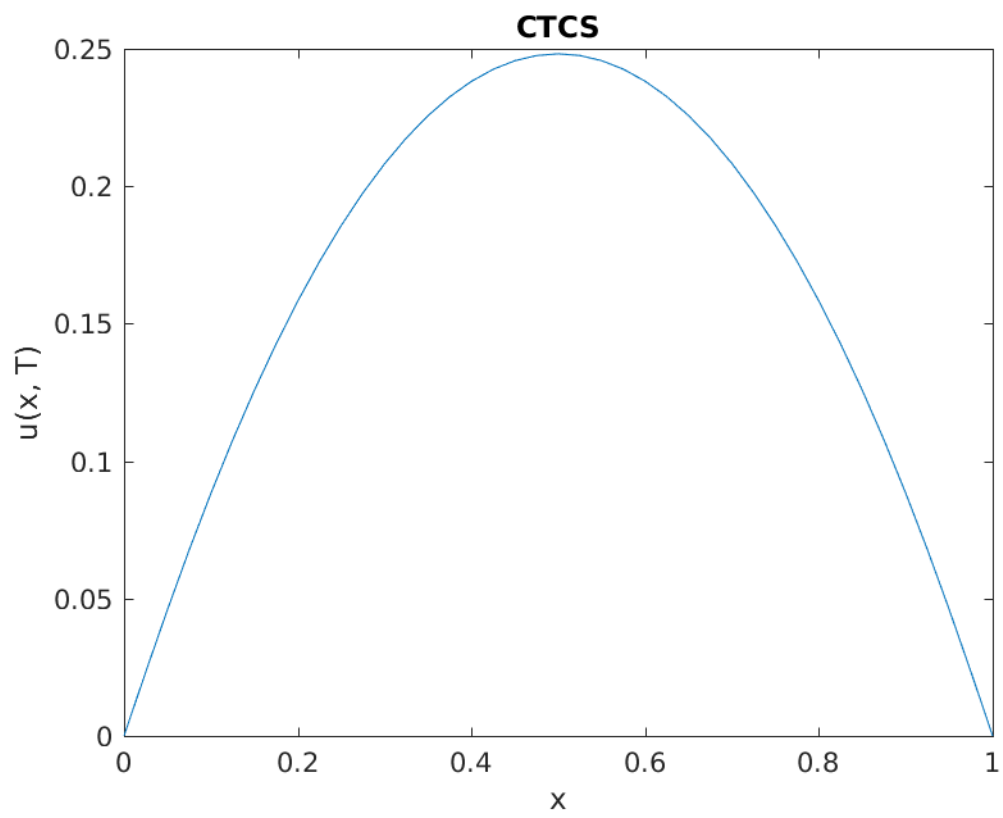
$$(b)f(x) = x(1 - x)$$

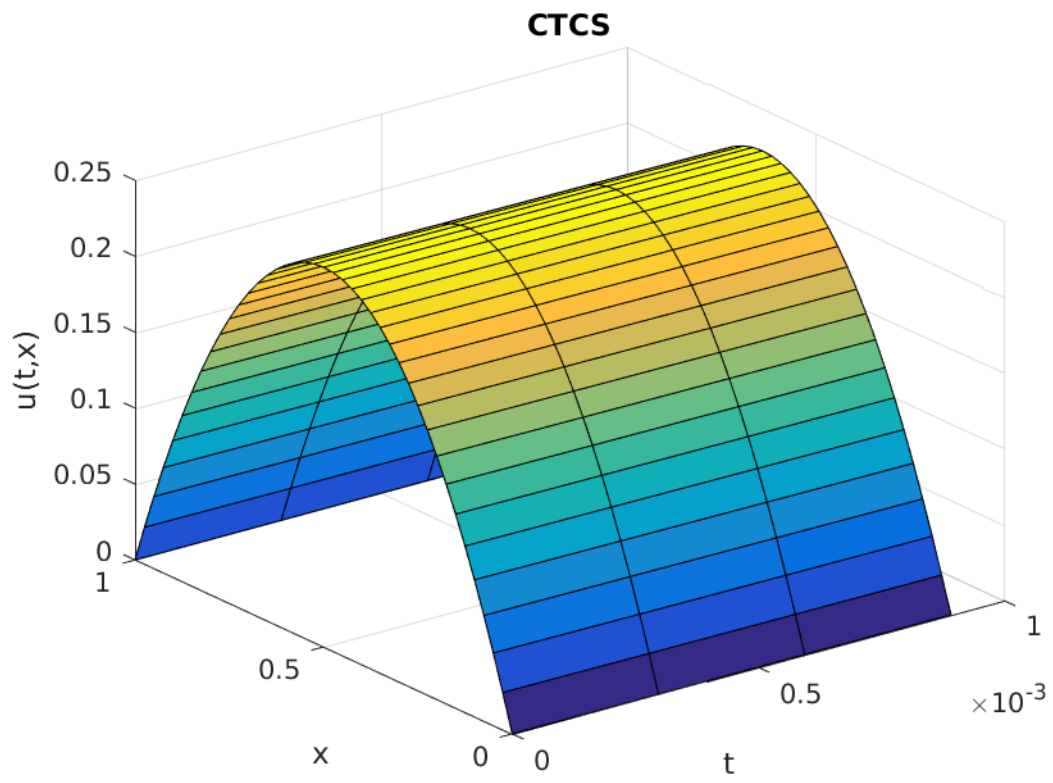












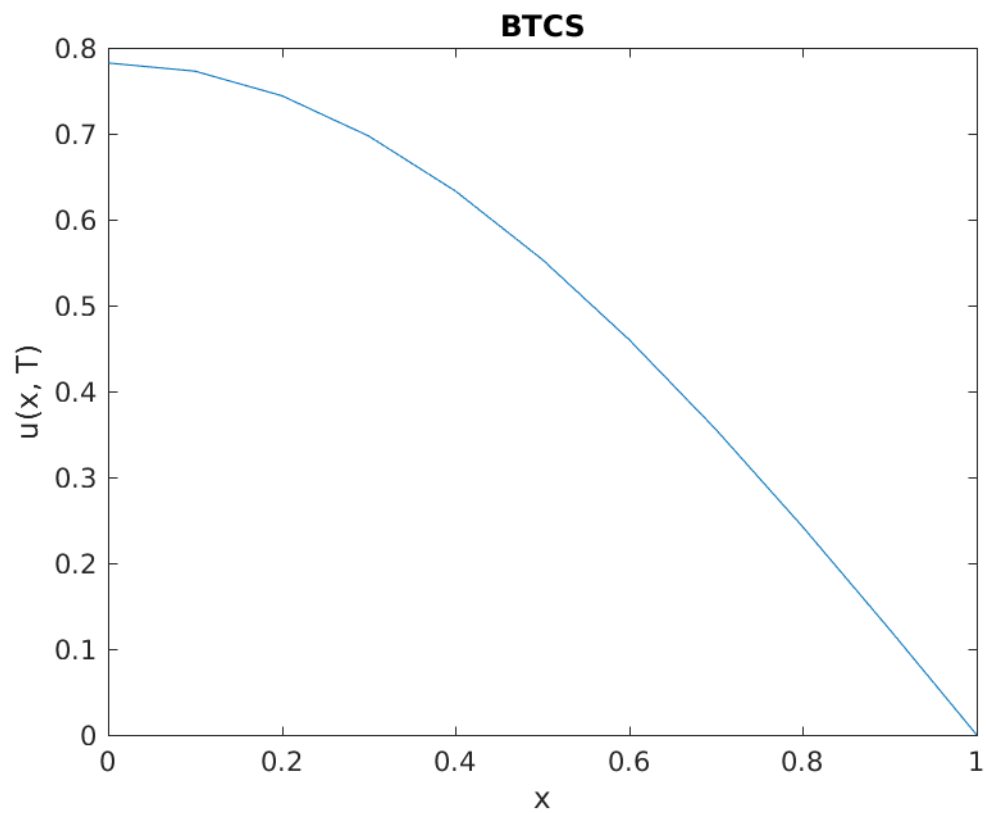


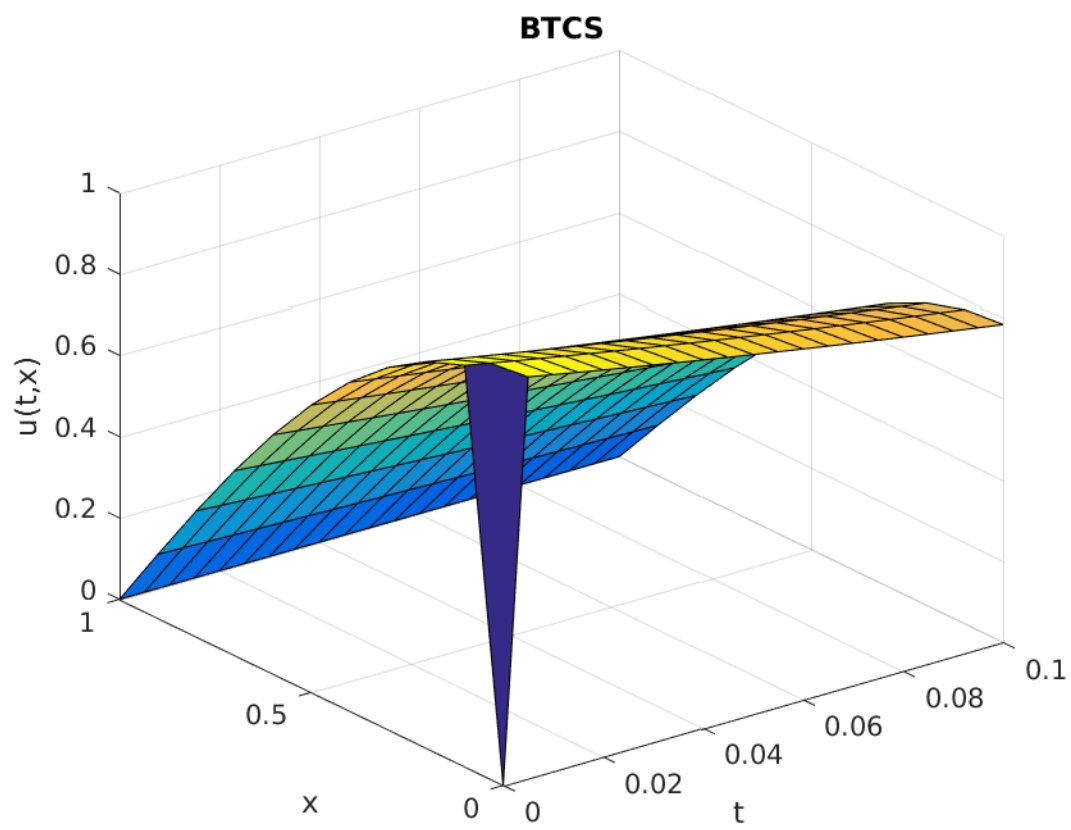
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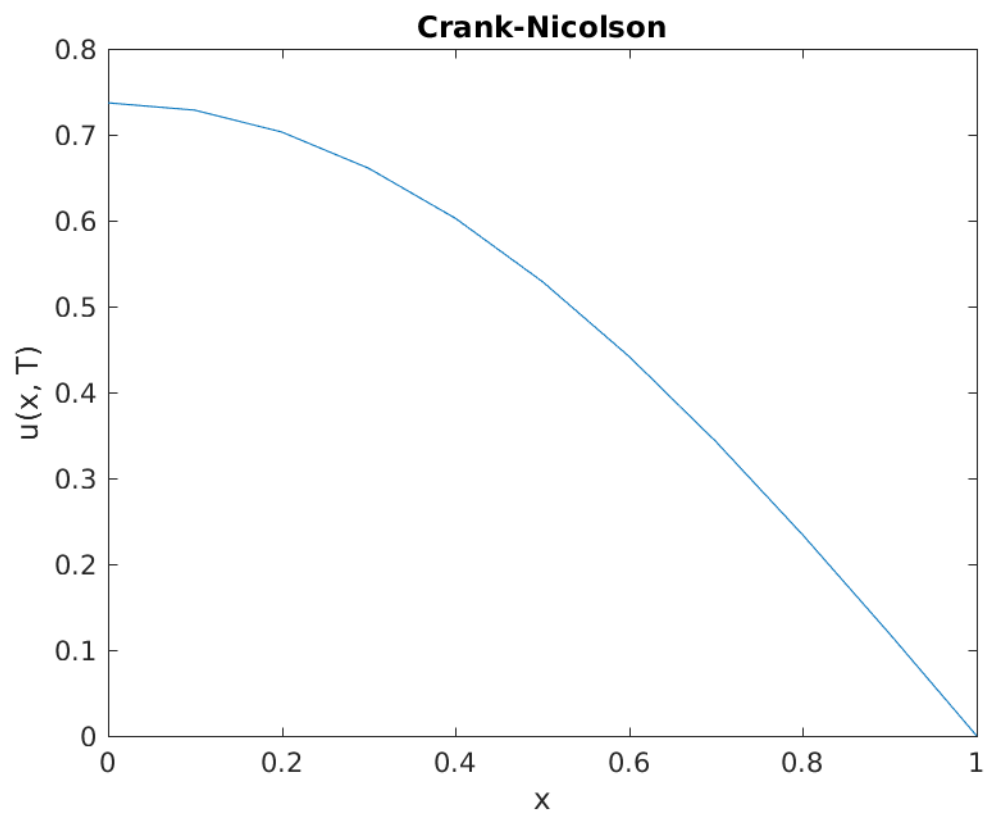
### Question 3

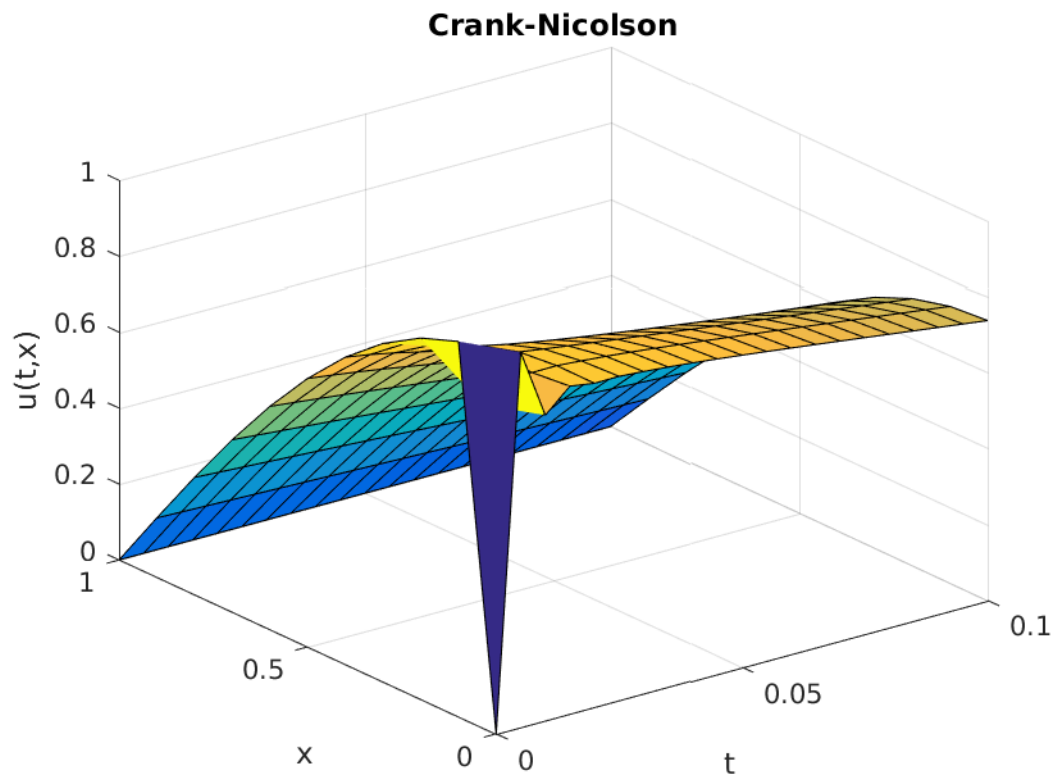
$U$  at  $t = 0.1$ .

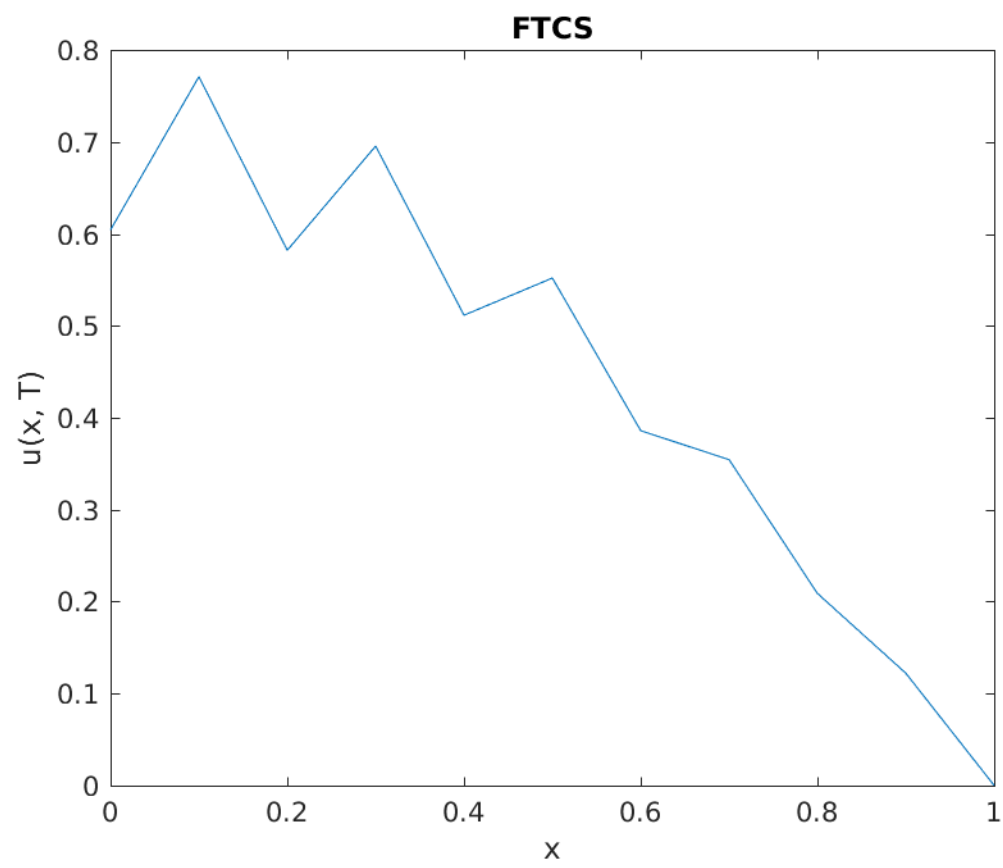
$$U = [0.7825, 0.7729, 0.7443, 0.6974, 0.6333, 0.5535, 0.4601, 0.3554, 0.2419, 0.1225, 0]$$

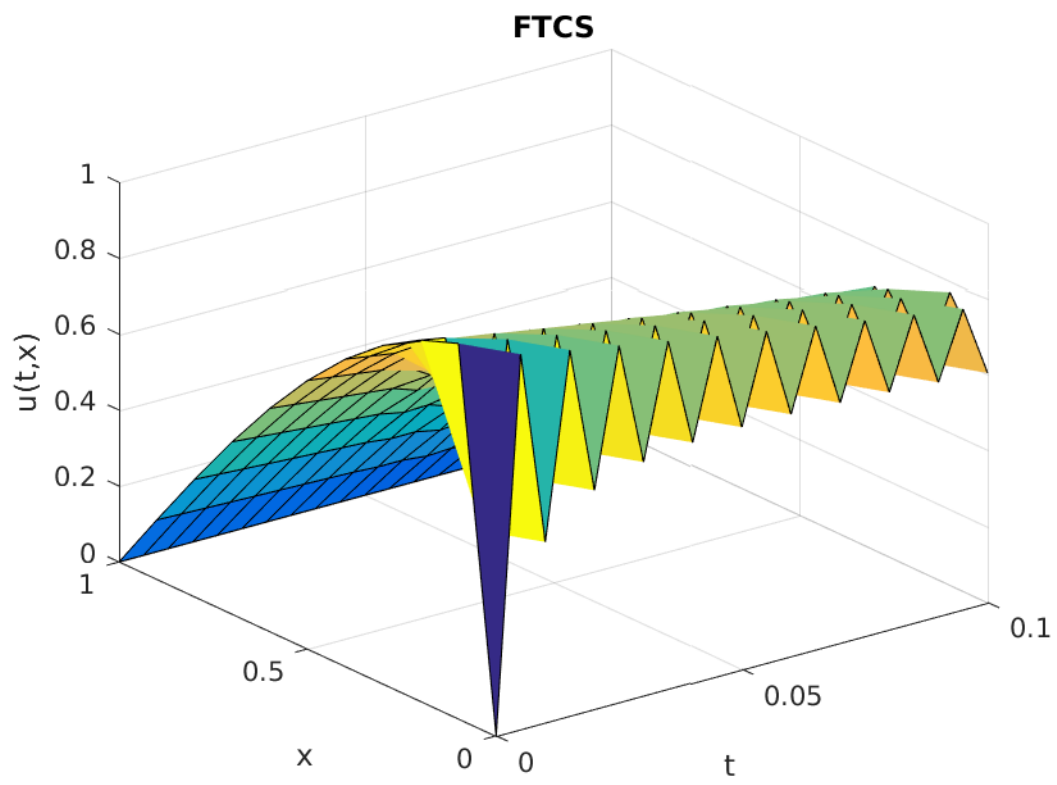












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## Question 4

