

ELEC 425 Assignment 3

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NOV 28TH, 2018

Question 1

The solution for question 1 is shown in Figure 1 below:

425 Assignment 3

Question 1

Given:

$P(1 F) = 1/6$	$P(1 L) = 1/10$	$P(z_1 = F) = 1/2$
$P(2 F) = 1/6$	$P(2 L) = 1/10$	$P(z_1 = L) = 1/2$
$P(3 F) = 1/6$	$P(3 L) = 1/10$	
$P(4 F) = 1/6$	$P(4 L) = 1/10$	$P(F F) = 3/5$ $P(L L) = 3/5$
$P(5 F) = 1/6$	$P(5 L) = 1/10$	$P(F L) = 2/5$ $P(L F) = 2/5$
$P(6 F) = 1/6$	$P(6 L) = 1/2$	

$$p(x, z) = \frac{1}{2} \times P(1|F) \times P(F|F) \times P(2|F) \times P(F|L) \times P(6|L) \times P(L|F) \times P(3|F) \times P(F|F) \times P(6|F)$$

$$= \frac{1}{2} \times \frac{1}{6} \times \frac{3}{5} \times \frac{1}{6} \times \frac{2}{5} \times \frac{1}{2} \times \frac{2}{5} \times \frac{1}{6} \times \frac{3}{5} \times \frac{1}{6}$$

$$= \frac{1}{90000} = 0.0000\overline{1}$$

Figure 1

Question 2

The solution for question 2 is shown in Figure 2 below:

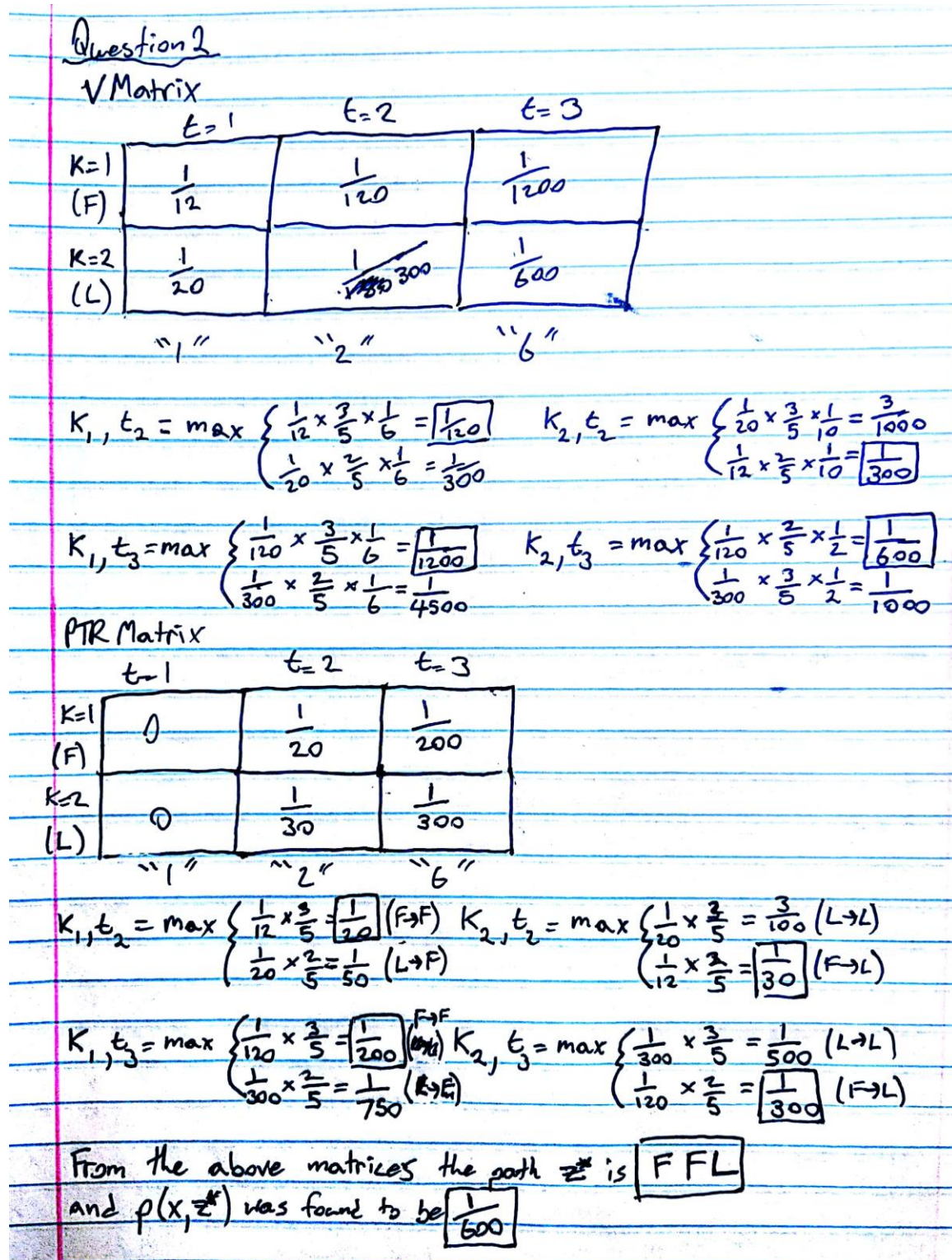


Figure 2

Question 3

The tanh activation function was implemented in activation_tanh.m, the function implemented was:

$$f(x) = \frac{2}{1 + e^{-2x}} - 1$$

The tanh gradient was implemented in activation_tanh_gradient.m, the gradient implemented was:

$$f'(x) = 1 - f(x)^2$$

feedforward_network_tanh.m was created as a modified version of feedforward_network_sigmoid.m where the activation function and gradient functions used were changed to be the newly created tanh activation and gradient functions shown above. The output of feedforward_network_tanh.m is shown in Figure 3 below:

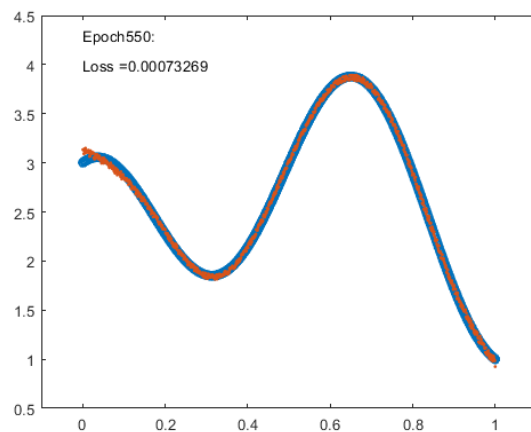


Figure 3

Out of curiosity I also ran feedforward_network_tanh.m with 2000 iterations to see if it completely converged on the provided wave. The output for 2000 iterations is shown in Figure 4 below:

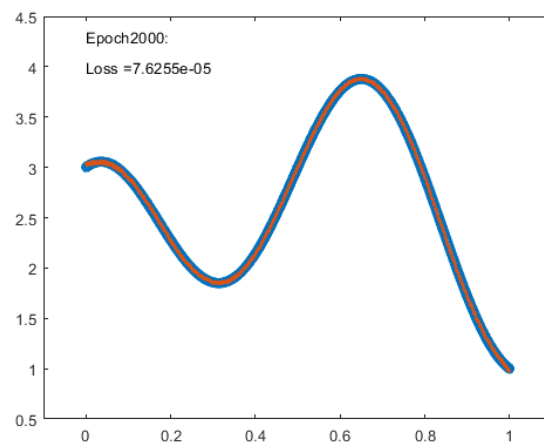


Figure 4