1. The data is discrete.

2. (a)

V(R)/V(TOT)(actual)	V(R)/V(TOT)(predicted)	t(R)-t(T)	f(R)-f(T)
0.4	0.413382421	30	-0.5
0.39	0.354343694	40	-0.4
0.31	0.310025519	45	-0.2
0.24	0.231475217	75	-0.6
0.49	0.537429845	15	-0.9
0.55	0.524979187	35	-1.6
0.34	0.299432858	50	-0.3
0.56	0.562176501	0	-0.5
0.64	0.610639234	-15	-0.3
0.68	0.721115178	-45	-0.1

(b) Goodness of fit is bad.

(c) Besides time and price, accessibility and reliability also influence the decision of which service to use.

3.
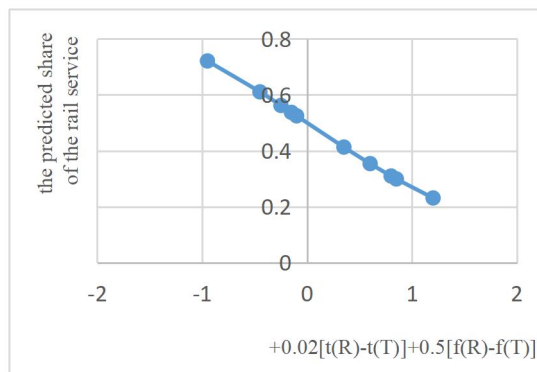
4. $t_R=100+0.066V_R$, $t_T=25+0.081V_T$, $f_R=1.25$, $f_T=2.25$, $V_{TOT}=1800$, $V_R+V_T=V_{TOT}$

$$\frac{V_R}{V_{TOT}}=\frac{1}{1+e^{+0.02(t_R-t_T)+0.5(f_R-f_T)}}$$

So, $V_R=759$ tons/day, $V_T=1041$ tons/day

5.

coefficient for price	V(R)/tons/day	V(T)/tons/day
0.3	721	1079
0.4	740	1060
0.5	759	1041
0.6	778	1022
0.7	798	1002

6. 759*1.25+1041*2.25=$3291/day. 350+759*0.75=$919.25/day. 3291+919.25=$4210.25/day. 1800*2.25=$4050/day. 4210.25>4050. So, the rail service should not be provided.

7. Once again, the rail service should not be provided.

coefficient for price	V(R)/tons/day	V(T)/tons/day			
0.3	721	1079	3329	890.75	4219.75
0.4	740	1060	3310	905	4215
0.5	759	1041	3291	919.25	4210.25
0.6	778	1022	3272	933.5	4205.5
0.7	798	1002	3252	948.5	4200.5

8. rail prices=[0.00, 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50, 2.75, 3.00].
net profit=[-970.00, -718.75, -481.00, -255.25, -41.50, 160.25, 350.00, 527.75, 694.0, 848.00, 991.00, 1122.50, 1242.50].
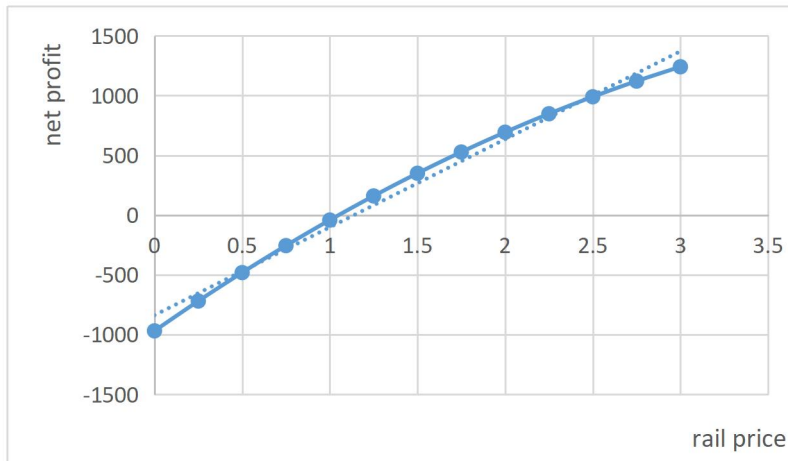
9.The profits of the truck service will decrease. The break-even point=$1.05/ton. When rail price is $1.05/ton, V_R=778tons/day and V_T=1022tons/day. 778*2.25-778*1.50=$583.50/day. The associated decrease in profits of the truck service is $583.50/day. Truck operators will not support the new service.

10.total volume=[1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300, 2400, 2500].

V_R=[613, 661, 710, 759, 809, 859, 909, 959, 1010, 1061, 1113].

V_T=[887, 939, 990, 1041, 1091, 1141, 1191, 1241, 1290, 1339, 1387].

net profit=[196.75, 184.75, 172.50, 160.25, 147.75, 135.25, 122.75, 110.25, 97.50, 84.75, 71.75].

So, the rail service should be provided, especially when total volume is large.