Assignment3- PorfolioEvaluation&OptionsVolatiltiyCurve

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OPTION DATA EXTRACTION AND SORTING, TOTAL VALUATION,TOTAL OPEN INTEREST(IN THE MONEY OPTIONS)

Table 1: OptionChain for Google Expiry date:Dec 14,2108 as of Nov 24,2018

ExpiryDate	Strike	OpenInterest	Underlying	Call_Put	Bid	Ask	valuation
2018-12-14	930.0	0	1023.88	Call	98.60	105.7	0.000
2018-12-14	940.0	0	1023.88	Call	90.20	96.9	0.000
2018-12-14	950.0	0	1023.88	Call	81.10	88.4	0.000
2018-12-14	960.0	0	1023.88	Call	73.10	79.9	0.000
2018-12-14	970.0	0	1023.88	Call	65.40	72.2	0.000
2018-12-14	980.0	0	1023.88	Call	59.60	64.7	0.000
2018-12-14	987.5	0	1023.88	Call	54.30	56.1	0.000
2018-12-14	990.0	0	1023.88	Call	52.70	54.2	0.000
2018-12-14	992.5	0	1023.88	Call	50.80	52.5	0.000
2018-12-14	995.0	0	1023.88	Call	49.20	50.8	0.000
2018-12-14	997.5	0	1023.88	Call	47.50	49.0	0.000
2018-12-14	1000.0	4	1023.88	Call	45.90	47.5	186.800
2018-12-14	1002.5	1	1023.88	Call	44.30	45.9	45.100
2018-12-14	1005.0	2	1023.88	Call	42.40	44.3	86.700
2018-12-14	1007.5	2	1023.88	Call	41.30	42.5	83.800
2018-12-14	1010.0	9	1023.88	Call	39.80	41.3	364.950
2018-12-14	1012.5	2	1023.88	Call	38.20	39.7	77.900
2018-12-14	1015.0	3	1023.88	Call	36.80	38.1	112.350
2018-12-14	1017.5	2	1023.88	Call	35.40	36.6	72.000
2018-12-14	1020.0	5	1023.88	Call	34.00	35.5	173.750
2018-12-14	1022.5	3	1023.88	Call	32.70	33.9	99.900
2018-12-14	1025.0	5	1023.88	Call	31.20	32.4	159.000
2018-12-14	1027.5	0	1023.88	Call	30.00	31.2	0.000
2018-12-14	1030.0	31	1023.88	Call	28.70	29.8	906.750
2018-12-14	1032.5	3	1023.88	Call	27.60	28.4	84.000
2018-12-14	1035.0	32	1023.88	Call	26.30	27.2	856.000
2018-12-14	1037.5	1	1023.88	Call	25.10	26.3	25.700
2018-12-14	1040.0	5	1023.88	Call	24.00	25.0	122.500
2018-12-14	1042.5	2	1023.88	Call	22.90	23.9	46.800
2018-12-14	1045.0	9	1023.88	Call	21.80	22.9	201.150
2018-12-14	1047.5	10	1023.88	Call	20.70	21.8	212.500
2018-12-14	1050.0	5	1023.88	Call	19.70	20.9	101.500
2018-12-14	1052.5	4	1023.88	Call	18.80	19.6	76.800
2018-12-14	1055.0	6	1023.88	Call	17.80	18.7	109.500
2018-12-14	1057.5	4	1023.88	Call	16.90	17.9	69.600
2018-12-14	1060.0	6	1023.88	Call	16.00	17.3	99.900
2018-12-14	1062.5	5	1023.88	Call	15.30	16.2	78.750

ExpiryDate	Strike	OpenInterest	Underlying	Call_Put	Bid	Ask	valuation
2018-12-14	1065.0	12	1023.88	Call	14.50	15.2	178.200
2018-12-14	1067.5	8	1023.88	Call	13.60	14.5	112.400
2018-12-14	1070.0	8	1023.88	Call	13.00	13.7	106.800
2018-12-14	1072.5	5	1023.88	Call	12.30	13.0	63.250
2018-12-14	1075.0	3	1023.88	Call	11.50	12.3	35.700
2018-12-14	1077.5	2	1023.88	Call	10.90	11.7	22.600
2018-12-14	1080.0	19	1023.88	Call	10.30	10.9	201.400
2018-12-14	1082.5	3	1023.88	Call	9.70	10.4	30.150
2018-12-14	1085.0	4	1023.88	Call	9.10	10.0	38.200
2018-12-14	1087.5	0	1023.88	Call	7.70	10.3	0.000
2018-12-14	1090.0	27	1023.88	Call	8.10	8.8	228.150
2018-12-14	1092.5	11	1023.88	Call	7.60	8.3	87.450
2018-12-14	1095.0	5	1023.88	Call	7.20	7.8	37.500
2018-12-14	1097.5	8	1023.88	Call	6.80	7.4	56.800
2018-12-14	1100.0	58	1023.88	Call	6.50	7.0	391.500
2018-12-14	1102.5	1	1023.88	Call	6.00	6.6	6.300
2018-12-14	1105.0	4	1023.88	Call	5.60	6.2	23.600
2018-12-14	1107.5	3	1023.88	Call	5.20	5.8	16.500
2018-12-14	1110.0	21	1023.88	Call	4.90	5.5	109.200
2018-12-14	1112.5	2	1023.88	Call	4.40	5.3	9.700
2018-12-14	1115.0	0	1023.88	Call	4.30	4.8	0.000
2018-12-14	1117.5	11	1023.88	Call	2.95	4.6	41.525
2018-12-14	1120.0	31	1023.88	Call	3.80	4.3	125.550
2018-12-14	1125.0	5	1023.88	Call	3.30	3.8	17.750
2018-12-14	930.0	10	1023.88	Put	6.20	6.7	64.500
2018-12-14	940.0	7	1023.88	Put	7.30	8.2	54.250
2018-12-14	950.0	23	1023.88	Put	8.50	9.8	210.450
2018-12-14	960.0	45	1023.88	Put	10.40	11.6	495.000
2018-12-14	970.0	26	1023.88	Put	12.70	13.6	341.900
2018-12-14	980.0	13	1023.88	Put	15.10	15.8	200.850
2018-12-14	987.5	0	1023.88	Put	17.10	18.1	0.000
2018-12-14	990.0	10	1023.88	Put	17.70	19.0	183.500
2018-12-14	992.5	0	1023.88	Put	18.60	19.7	0.000
2018-12-14	995.0	12	1023.88	Put	19.60	20.3	239.400
2018-12-14	997.5	0	1023.88	Put	20.00	21.2	0.000
2018-12-14	1000.0	61	1023.88	Put	21.20	22.0	1317.600
2018-12-14	1002.5	19	1023.88	Put	21.80	23.1	426.550
2018-12-14	1005.0	9	1023.88	Put	22.70	23.8	209.250
2018-12-14	1007.5	1	1023.88	Put	23.70	24.8	24.250
2018-12-14	1010.0	61	1023.88	Put	25.00	25.7	1546.350
2018-12-14	1012.5	9	1023.88	Put	25.80	26.8	236.700
2018-12-14	1015.0	19	1023.88	Put	27.00	27.8	520.600
2018-12-14	1017.5	5	1023.88	Put	27.80	28.8	141.500
2018-12-14	1020.0	53	1023.88	Put	28.90	29.9	1558.200
2018-12-14	1022.5	1	1023.88	Put	29.80	31.2	30.500
2018-12-14	1025.0	31	1023.88	Put	30.90	32.3	979.600
2018-12-14	1027.5	2	1023.88	Put	32.10	33.5	65.600
2018-12-14	1030.0	12	1023.88	Put	33.60	34.7	409.800
2018-12-14	1032.5	0	1023.88	Put	34.50	36.0	0.000
2018-12-14	1035.0	12	1023.88	Put	36.00	37.2	439.200
2018-12-14	1037.5	1	1023.88	Put	37.40	38.5	37.950
2018-12-14	1040.0	5	1023.88	Put	38.70	39.9	196.500

ExpiryDate	Strike	OpenInterest	Underlying	Call_Put	Bid	Ask	valuation
2018-12-14	1042.5	4	1023.88	Put	40.00	41.4	162.800
2018-12-14	1045.0	16	1023.88	Put	41.20	42.8	672.000
2018-12-14	1047.5	2	1023.88	Put	43.10	44.2	87.300
2018-12-14	1050.0	21	1023.88	Put	44.50	45.6	946.050
2018-12-14	1052.5	2	1023.88	Put	45.90	47.4	93.300
2018-12-14	1055.0	42	1023.88	Put	47.50	48.9	2024.400
2018-12-14	1057.5	4	1023.88	Put	48.80	50.4	198.400
2018-12-14	1060.0	21	1023.88	Put	51.10	52.1	1083.600
2018-12-14	1062.5	5	1023.88	Put	51.40	54.2	264.000
2018-12-14	1065.0	24	1023.88	Put	53.50	55.9	1312.800
2018-12-14	1067.5	2	1023.88	Put	52.40	60.4	112.800
2018-12-14	1070.0	7	1023.88	Put	54.20	60.7	402.150
2018-12-14	1072.5	1	1023.88	Put	56.00	63.3	59.650
2018-12-14	1075.0	9	1023.88	Put	57.80	65.3	553.950
2018-12-14	1077.5	10	1023.88	Put	59.60	66.9	632.500
2018-12-14	1080.0	13	1023.88	Put	61.50	68.9	847.600
2018-12-14	1082.5	3	1023.88	Put	63.50	71.2	202.050
2018-12-14	1085.0	3	1023.88	Put	65.40	73.4	208.200
2018-12-14	1087.5	0	1023.88	Put	67.20	75.3	0.000
2018-12-14	1090.0	18	1023.88	Put	69.40	77.2	1319.400
2018-12-14	1092.5	0	1023.88	Put	71.40	79.2	0.000
2018-12-14	1095.0	0	1023.88	Put	73.50	81.3	0.000
2018-12-14	1097.5	1	1023.88	Put	78.50	80.2	79.350
2018-12-14	1100.0	20	1023.88	Put	77.80	85.4	1632.000
2018-12-14	1102.5	0	1023.88	Put	79.90	87.5	0.000
2018-12-14	1105.0	0	1023.88	Put	81.70	89.6	0.000
2018-12-14	1107.5	0	1023.88	Put	84.10	91.8	0.000
2018-12-14	1110.0	15	1023.88	Put	86.20	93.6	1348.500
2018-12-14	1112.5	0	1023.88	Put	88.50	96.2	0.000
2018-12-14	1115.0	2	1023.88	Put	90.60	98.1	188.700
2018-12-14	1117.5	0	1023.88	Put	92.90	100.6	0.000
2018-12-14	1120.0	13	1023.88	Put	95.00	102.7	1285.050
2018-12-14	1125.0	1	1023.88	Put	99.50	107.4	103.450

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## Warning in bind_rows_(x, .id): binding character and factor vector,
## coercing into character vector
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Table 2: Total Valuation of Call,Put and Both

Call_Put	Valuation
Call	6393.925
Put	25750.000
Callandput	32143.925

Table 3: Total OpenInterest of In the Money Options

sum(OpenInterest)
355

Implied Volatility Vs Strike Price

Question:Sample Portfolio Valuation

Question asks us to use GBS Option and create a sample portfolio. I have Calculated cost of portfolio(cost of buying all options),Total value of Payoffs

Table 4: Sample

type	strike	underlying	Time	r	b	sigma
p	22	43	1	0.01	0	0.3
c	52	79	1	0.01	0	0.3
p	39	34	1	0.01	0	0.3
p	26	80	1	0.01	0	0.3
c	64	1	1	0.01	0	0.3
c	38	8	1	0.01	0	0.3
p	6	9	1	0.01	0	0.3
c	62	97	1	0.01	0	0.3
p	25	79	1	0.01	0	0.3
p	11	4	1	0.01	0	0.3
c	86	19	1	0.01	0	0.3
c	41	78	1	0.01	0	0.3
c	39	18	1	0.01	0	0.3
c	7	31	1	0.01	0	0.3
p	45	41	1	0.01	0	0.3
c	42	81	1	0.01	0	0.3

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type	strike	underlying	Time	r	b	sigma
c	28	51	1	0.01	0	0.3
p	49	57	1	0.01	0	0.3
c	24	14	1	0.01	0	0.3
p	80	42	1	0.01	0	0.3
c	37	52	1	0.01	0	0.3
p	83	39	1	0.01	0	0.3
p	66	95	1	0.01	0	0.3
c	73	42	1	0.01	0	0.3
c	81	10	1	0.01	0	0.3
p	1	41	1	0.01	0	0.3
p	24	61	1	0.01	0	0.3
p	70	57	1	0.01	0	0.3
p	99	32	1	0.01	0	0.3
c	51	77	1	0.01	0	0.3
p	38	18	1	0.01	0	0.3
c	95	75	1	0.01	0	0.3
p	35	68	1	0.01	0	0.3
p	11	89	1	0.01	0	0.3
p	65	82	1	0.01	0	0.3
p	0	71	1	0.01	0	0.3
p	63	56	1	0.01	0	0.3
c	59	41	1	0.01	0	0.3
c	47	40	1	0.01	0	0.3
p	84	29	1	0.01	0	0.3
c	98	9	1	0.01	0	0.3
p	91	30	1	0.01	0	0.3
p	38	14	1	0.01	0	0.3
p	61	95	1	0.01	0	0.3
p	13	91	1	0.01	0	0.3
c	16	62	1	0.01	0	0.3
p	84	50	1	0.01	0	0.3
p	24	35	1	0.01	0	0.3
p	50	30	1	0.01	0	0.3
c	90	54	1	0.01	0	0.3
c	0	74	1	0.01	0	0.3
p	54	99	1	0.01	0	0.3
p	22	66	1	0.01	0	0.3
c	75	95	1	0.01	0	0.3
p	62	39	1	0.01	0	0.3
p	15	71	1	0.01	0	0.3
c	62	72	1	0.01	0	0.3
c	4	21	1	0.01	0	0.3
p	21	62	1	0.01	0	0.3
c	2	87	1	0.01	0	0.3
c	71	71	1	0.01	0	0.3
c	73	10	1	0.01	0	0.3
c	26	69	1	0.01	0	0.3
c	39	88	1	0.01	0	0.3
p	86	91	1	0.01	0	0.3
p	12	79	1	0.01	0	0.3
p	35	79	1	0.01	0	0.3
p	77	50	1	0.01	0	0.3

type	strike	underlying	Time	r	b	sigma
c	47	87	1	0.01	0	0.3
c	68	24	1	0.01	0	0.3
p	40	48	1	0.01	0	0.3
p	2	46	1	0.01	0	0.3
p	88	22	1	0.01	0	0.3
p	36	96	1	0.01	0	0.3
p	95	30	1	0.01	0	0.3
p	69	47	1	0.01	0	0.3
c	72	72	1	0.01	0	0.3
p	65	82	1	0.01	0	0.3
c	94	61	1	0.01	0	0.3
p	90	2	1	0.01	0	0.3
c	73	77	1	0.01	0	0.3
p	31	95	1	0.01	0	0.3
c	4	75	1	0.01	0	0.3
c	59	33	1	0.01	0	0.3
c	29	37	1	0.01	0	0.3
p	22	28	1	0.01	0	0.3
c	31	50	1	0.01	0	0.3
p	32	39	1	0.01	0	0.3
c	22	1	1	0.01	0	0.3
p	49	42	1	0.01	0	0.3
c	73	91	1	0.01	0	0.3
p	8	31	1	0.01	0	0.3
p	68	44	1	0.01	0	0.3
p	72	16	1	0.01	0	0.3
p	74	57	1	0.01	0	0.3
p	72	78	1	0.01	0	0.3
c	69	49	1	0.01	0	0.3
c	0	36	1	0.01	0	0.3
p	73	12	1	0.01	0	0.3
p	64	13	1	0.01	0	0.3

Table 5: Cost of Buying All options and Total Payoff Value

portfolio_priceofAlloptions	portfolio_Payoffvalue
1753.408	8728

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