



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2009/2010**

SUBJECT NAME : CONSTRUCTION PLANNING AND SCHEDULING

SUBJECT CODE : BFP 4013

COURSE : 4 BFP

EXAMINATION DATE : NOVEMBER 2009

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL **TWO (2)** QUESTIONS IN **PART A** AND **TWO (2)** QUESTIONS ONLY IN **PART B**

THIS PAPER CONSIST OF THIRTEEN (13) PAGES

PART A

Q1 Based on Table Q1, answer all the questions below:

- (a) Estimate the total project duration using arrow diagram method. (15 marks)
- (b) Calculate the total float for each activity in the project. (2 marks)
- (c) Draw a bar chart based on calculation in Q1(a) and (b). (8 marks)

Q2 Resource leveling is an attempt to assign resources to project activities in a manner that will improve productivity and efficiency.

- (a) Give **two (2)** examples of situation where resource leveling is appropriate to be employed. (3 marks)
- (b) Based on network diagram in Figure Q2 and weekly labour requirement in Table Q2, draw a time-based networks using early start times (ES-TF) and a histogram of labour loading. (10 marks)
- (c) You are required to level your labour up to maximum 15 labours per day. Update your time-based networks and labour loading histogram produced in Q2(b), to depicts the labour loading after resource leveling is exercised. (12 marks)

PART B

- Q3** As a developer for housing development, you were awarded a project to develop a housing complex for Taman Damai, Parit Raja, Batu Pahat, Johor. This project consists of three areas which are area A for west side, area B for east side and area C for south side. Pertaining to the project, client requires you to recommend and explain on the following:
- (a) The importance of Work Breakdown Structure (WBS) and Organisational Breakdown Structure (OBS) in planning and scheduling. (7 marks)
 - (b) WBS for your project based on Project, Area, Activity and Sub-activity. (9 marks)
 - (c) OBS (with at least 5 levels) for your project. (9 marks)
- Q4**
- (a) A sub-contractor agreed to build 30 pile caps in 90 days at RM 750 per unit. Twenty days (20) later, the contractor has finished 12 pile caps with an actual total cost which is direct cost at RM 5,200 and indirect cost at RM 1,300.
 - (i) Determine the daily planned budget for the contractor. (5 marks)
 - (ii) Using the "Earned Value" approach, determine the status of this project. (12 marks)
 - (b) Discuss briefly the total quality management, quality assurance and quality control in construction industry and why they are very important. (8 marks)
- Q5** Crashing a project means the process of accelerating an activity or multiple activities to shorten the overall duration of a project.
- (a) Based on the network diagram in Figure Q5, determine the normal overall project duration and the critical path. (2 marks)
 - (b) Based on the information in Table Q5, crash the project activities appropriately to get the possible shortest project duration. (9 marks)
 - (c) Produce a table showing the crashing step in Q5(b) and its impact on the duration and direct cost of the project. (5 marks)

BAHAGIAN A

S1 Berdasarkan Jadual Q1, jawab soalan-soalan berikut:

- (a) Anggarkan jumlah tempoh projek menggunakan Kaedah Gambarajah Anak Panah. (15 markah)
- (d) Hitungkan jumlah apungan bagi setiap aktiviti di dalam projek tersebut. (2 markah)
- (e) Lukiskan satu carta bar berdasarkan hitungan anda di S1(a) dan (b). (8 markah)

S2 Pengarasan sumber adalah suatu usaha pengagihan sumber kepada aktiviti-aktiviti projek untuk meningkatkan produktiviti dan efisien.

- (a) Berikan **dua (2)** contoh situasi di mana pengarasan sumber sesuai digunakan. (3 markah)
- (b) Berdasarkan gambarajah rangkaian di Rajah Q2 dan keperluan mingguan buruh di dalam Jadual Q2, lukiskan rangkaian berasaskan masa (*time-based networks*) menggunakan masa mulaan terawal (ES-TF) dan satu histogram jumlah buruh. (10 markah)
- (c) Anda dikehendaki mengaras jumlah pekerja kepada maksimum 15 buruh sehari. Kemaskini rangkaian berasaskan masa (*time-based networks*) dan histogram jumlah buruh yang telah dihasilkan di S2 (b) untuk menggambarkan agihan buruh selepas pengarasan sumber dilakukan. (12 markah)

BAHAGIAN B

- S3** Sebagai seorang pemaju perumahan, anda telah diberikan satu projek untuk membangunkan sebuah kompleks perumahan bagi Taman Damai, Parit Raja, Batu Pahat, Johor. Projek ini meliputi tiga buah kawasan iaitu kawasan A di bahagian barat, kawasan B di bahagian timur dan kawasan C di bahagian selatan. Berhubung projek tersebut, klien meminta anda mencadangkan dan menerangkan perkara-perkara berikut:
- (a) Kepentingan *Work Breakdown Structure (WBS)* dan *Organisational Breakdown Structure (OBS)* di dalam perancangan dan penjadualan. (7 markah)
 - (b) WBS bagi projek anda berdasarkan Projek, Kawasan, Aktiviti dan Sub-aktiviti. (9 markah)
 - (c) OBS (minimum 5 peringkat) bagi projek anda. (9 markah)
- S4**
- (a) Seorang kontraktor telah bersetuju membina 30 tetopi cerucuk dalam masa 90 hari pada harga RM 750 per unit. Dua puluh (20) hari kemudian, kontraktor itu telah berjaya menyiapkan 12 unit pada jumlah kos sebenar di mana RM 5,200 adalah kos langsung dan RM 1,300 adalah kos tidak langsung.
 - (i) Tentukan bajet terancang harian bagi kontraktor tersebut. (5 markah)
 - (ii) Menggunakan pendekatan "Earned Value", tentukan status projek ini. (12 markah)
 - (b) Bincangkan dengan ringkas pengurusan kualiti menyeluruh (total quality management), jaminan kualiti dan kawalan kualiti di dalam industri pembinaan dan mengapakah ia sangat penting. (8 markah)
- S5** Pemendekan sesuatu projek bermaksud proses mempercepatkan aktiviti atau beberapa aktiviti untuk memendekkan keseluruhan tempoh sesuatu projek.
- (a) Berdasarkan gambarajah rangkaian di dalam Rajah Q5, tentukan tempoh penyiapan normal dan laluan kritikal bagi projek tersebut. (2 markah)
 - (b) Berdasarkan maklumat di dalam Jadual Q5, lakukan pemendekan aktiviti-aktiviti projek sewajarnya untuk mendapatkan tempoh terpendek projek yang mungkin. (9 markah)
 - (c) Sediakan satu jadual yang menunjukkan langkah-langkah pemendekan di S5(b) dan kesannya kepada tempoh penyiapan dan kos langsung projek tersebut. (5 markah)

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TABLE O1: Project activities

ACTIVITY	SUCCESSOR	DURATION (WEEKS)
A	B, C, D	1
B	H	3
C	G, E	3
D	F	2
E	F	3
F	I	1
G	J	2
H	K	2
I	J	1
J	M	2
K	M, L	3
L	-	4
M	-	3

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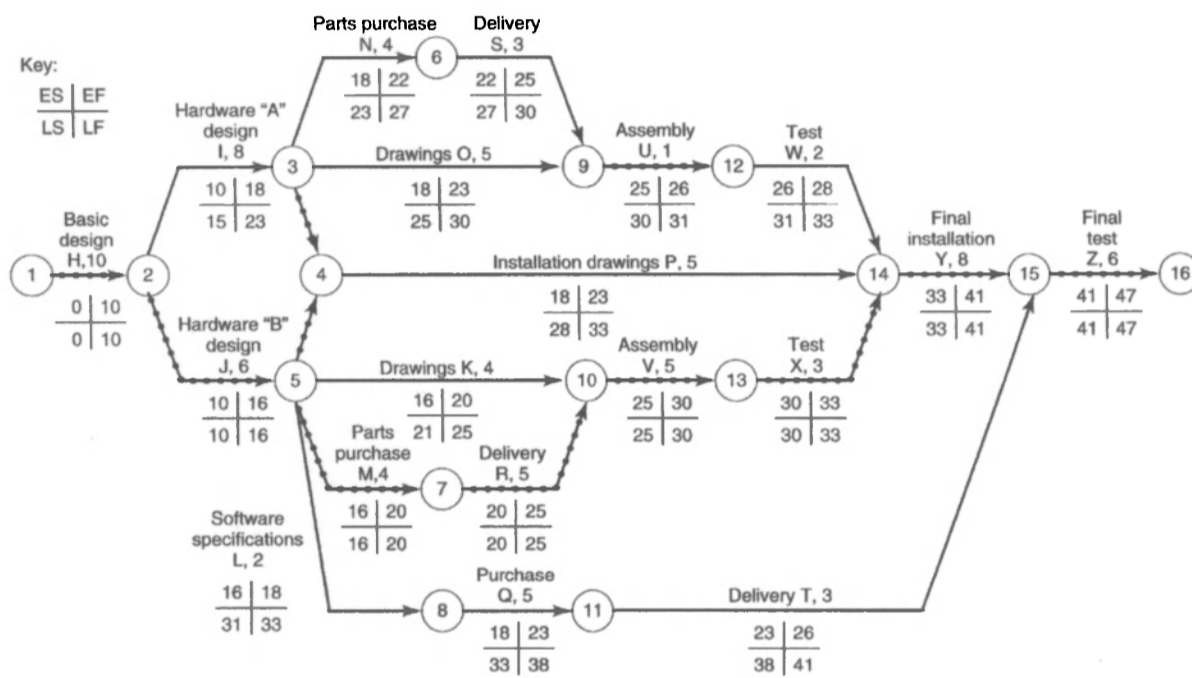


FIGURE O2

TABLE O2

Activity	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Duration (weeks)	10	8	6	4	2	4	4	5	5	5	5	3	3	1	5	2	3	8	6
Weekly Labor Requirements (workers)	5	4	8	2	6	3	2	5	6	2	0	0	0	9	14	6	6	14	5

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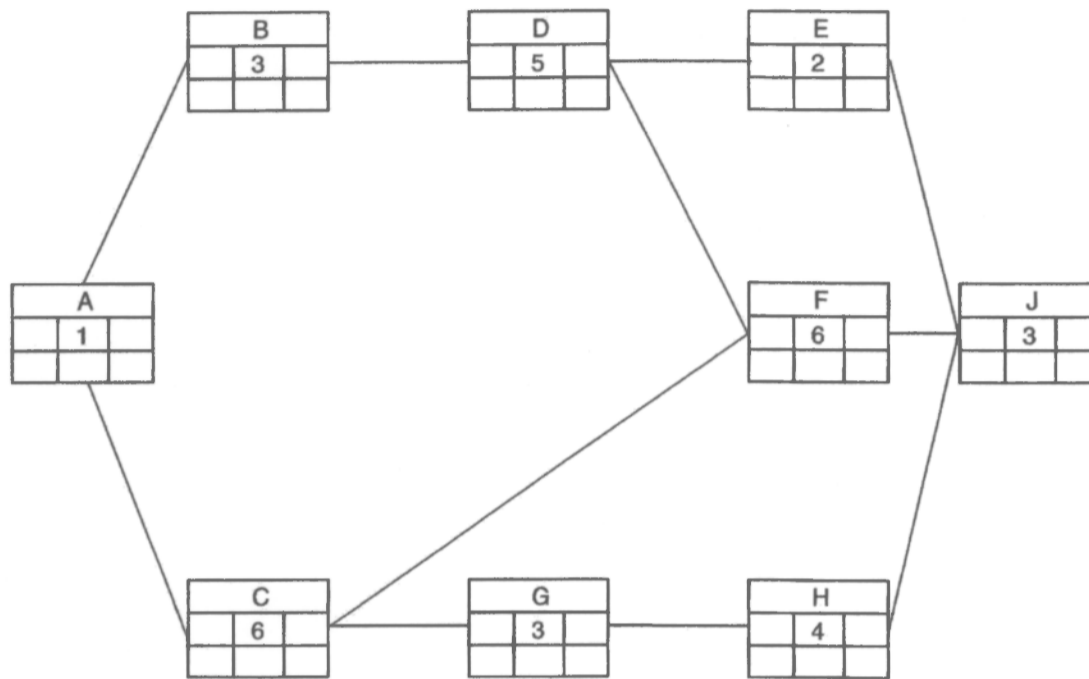


FIGURE 05

TABLE 05

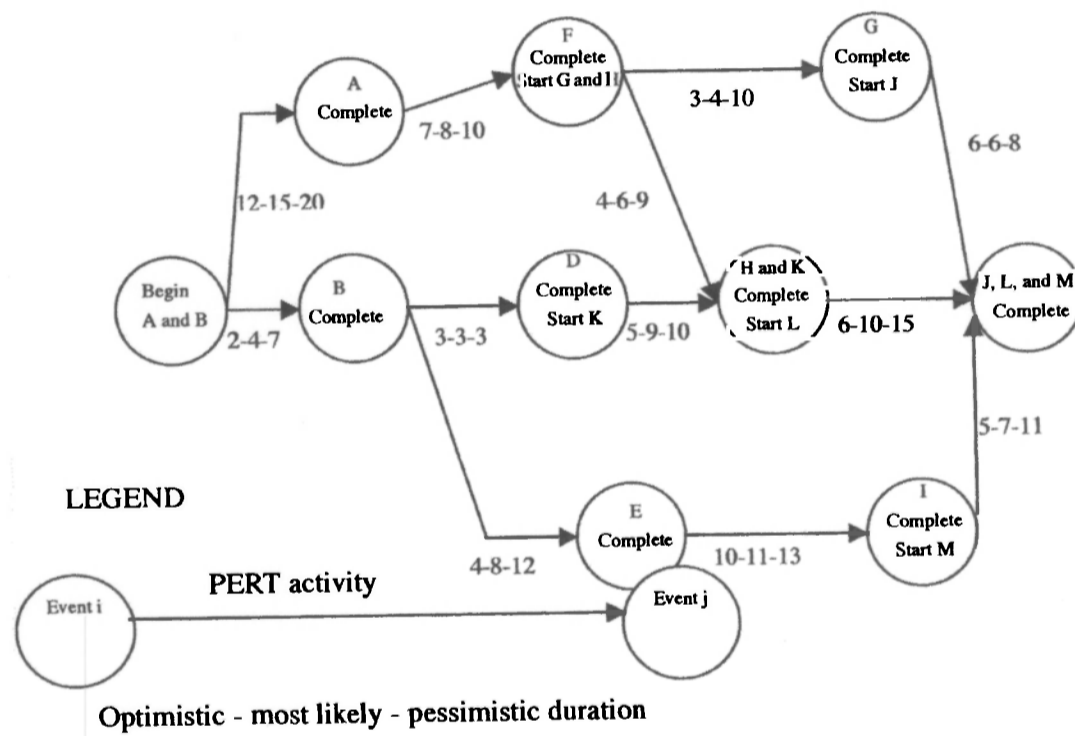
Activity #	Time Normal	Time Crash	Cost Normal	Time Difference	Cost Difference	Slope \$/Day
A	1	1	\$1,000	0	0	
B	3	2	\$2,000	1	\$100	\$100
C	6	1	\$1,000	5	\$450	\$90
D	5	3	\$1,000	2	\$60	\$30
E	2	1	\$1,000	1	\$40	\$40
F	6	2	\$1,000	4	\$320	\$80
G	3	1	\$1,000	2	\$150	\$75
H	4	3	\$1,000	1	\$60	\$60
J	3	2	\$1,000	1	\$150	\$150

\$10,000

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TABLE O6

$$f(z,0.1) = \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}} \quad \text{for Positive Values} \quad \text{When } Z = 1.230, p = 0.8906514 \text{ or } 89.1\%$$

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.00	0.5000000	0.5039894	0.5079784	0.5119665	0.5159535	0.5199389	0.5239223	0.5279032	0.5318814	0.5358563
0.10	0.5398279	0.5437954	0.5477585	0.5517168	0.5556700	0.5596177	0.5635595	0.5674949	0.5714237	0.5753455
0.20	0.5792597	0.5831661	0.5870644	0.5909541	0.5948348	0.5987063	0.6025681	0.6064198	0.6102612	0.6140923
0.30	0.6179114	0.6217195	0.6255158	0.6293000	0.6330717	0.6368306	0.6405764	0.6443087	0.6480272	0.6517317
0.40	0.6554217	0.6590970	0.6627572	0.6664021	0.6700314	0.6736448	0.6772419	0.6808225	0.6843863	0.6879331
0.50	0.6914625	0.6949743	0.6984682	0.7019441	0.7054015	0.7088403	0.7122603	0.7156612	0.7190427	0.7224047
0.60	0.7257469	0.7290692	0.7323712	0.7356528	0.7389138	0.7421540	0.7453732	0.7485712	0.7517478	0.7549031
0.70	0.7580364	0.7611480	0.7642376	0.7673050	0.7703501	0.7733727	0.7763728	0.7793501	0.7823046	0.7852362
0.80	0.7881447	0.7910300	0.7938920	0.7967307	0.7995459	0.8023375	0.8051055	0.8078498	0.8105704	0.8132677
0.90	0.8159399	0.8185888	0.8212136	0.8238145	0.8263912	0.8289439	0.8314724	0.8339768	0.8364569	0.8389129
1.00	0.8413447	0.8437523	0.8461358	0.8484950	0.8508300	0.8531409	0.8554277	0.8576903	0.8599289	0.8621434
1.10	0.8643339	0.8665004	0.8686431	0.8707618	0.8728568	0.8749280	0.8769755	0.8789995	0.8809998	0.8829767
1.20	0.8849303	0.8868605	0.8887675	0.8906514	0.8925122	0.8943502	0.8961653	0.8979576	0.8997274	0.9014746
1.30	0.9031995	0.9049020	0.9065824	0.9082408	0.9098773	0.9114919	0.9130850	0.9146565	0.9162066	0.9177355
1.40	0.9192433	0.9207301	0.9221961	0.9236414	0.9250663	0.9264707	0.9278549	0.9292191	0.9305633	0.9318879
1.50	0.9331928	0.9344783	0.9357445	0.9369916	0.9382198	0.9394292	0.9406200	0.9417924	0.9429466	0.9440826
1.60	0.9452007	0.9463011	0.9473839	0.9484493	0.9494974	0.9505285	0.9515428	0.9525403	0.9535214	0.9544861
1.70	0.9554346	0.9563671	0.9572838	0.9581849	0.9590705	0.9599409	0.9607961	0.9616365	0.9624621	0.9632731
1.80	0.9640697	0.9648522	0.9656206	0.9663751	0.9671159	0.9678433	0.9685573	0.9692582	0.9699460	0.9706211
1.90	0.9712835	0.9719335	0.9725711	0.9731967	0.9738102	0.9744120	0.9750022	0.9755809	0.9761483	0.9767046
2.00	0.9772499	0.9777845	0.9783084	0.9788218	0.9793249	0.9798179	0.9803008	0.9807739	0.9812373	0.9816912
2.10	0.9821356	0.9825709	0.9829970	0.9834143	0.9838227	0.9842224	0.9846137	0.9849966	0.9853713	0.9857379
2.20	0.9860966	0.9864475	0.9867907	0.9871263	0.9874546	0.9877756	0.9880894	0.9883962	0.9886962	0.9889894
2.30	0.9892759	0.9895559	0.9898296	0.9900969	0.9903582	0.9906133	0.9908625	0.9911060	0.9913437	0.9915758
2.40	0.9918025	0.9920237	0.9922397	0.9924506	0.9926564	0.9928572	0.9930531	0.9932443	0.9934309	0.9936128
2.50	0.9937903	0.9939634	0.9941322	0.9942969	0.9944574	0.9946138	0.9947664	0.9949150	0.9950600	0.9952012
2.60	0.9953388	0.9954729	0.9956035	0.9957307	0.9958547	0.9959754	0.9960929	0.9962074	0.9963188	0.9964274
2.70	0.9965330	0.9966358	0.9967359	0.9968332	0.9969280	0.9970202	0.9971099	0.9971971	0.9972820	0.9973645
2.80	0.9974448	0.9975229	0.9975988	0.9976725	0.9977443	0.9978140	0.9978817	0.9979476	0.9980116	0.9980737
2.90	0.9981341	0.9981928	0.9982498	0.9983051	0.9983589	0.9984111	0.9984617	0.9985109	0.9985587	0.9986050
3.00	0.9986500	0.9986937	0.9987361	0.9987772	0.9988170	0.9988557	0.9988932	0.9989296	0.9989649	0.9989991

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TABLE O6 (continued)

$$f(z,0,1) = \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}}$$

for Negative Values When Z = -1.230, p = 0.1093486 or 10.9%

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.00	0.5000000	0.4960106	0.4920216	0.4880335	0.4840465	0.4800611	0.4760777	0.4720968	0.4681186	0.4641435
-0.10	0.4601721	0.4562046	0.4522415	0.4482832	0.4443300	0.4403823	0.4364405	0.4325051	0.4285763	0.4246546
-0.20	0.4207403	0.4168339	0.4129356	0.4090459	0.4051652	0.4012937	0.3974319	0.3935802	0.3897388	0.3859082
-0.30	0.3820886	0.3782805	0.3744842	0.3707000	0.3669283	0.3631694	0.3594236	0.3556913	0.3519728	0.3482683
-0.40	0.3445783	0.3409030	0.3372428	0.3335979	0.3299686	0.3263552	0.3227581	0.3191775	0.3156137	0.3120669
-0.50	0.3085375	0.3050257	0.3015318	0.2980559	0.2945985	0.2911597	0.2877397	0.2843388	0.2809573	0.2775953
-0.60	0.2742531	0.2709308	0.2676288	0.2643472	0.2610862	0.2578460	0.2546268	0.2514288	0.2482522	0.2450970
-0.70	0.2419636	0.2388520	0.2357624	0.2326950	0.2296499	0.2266273	0.2236272	0.2206499	0.2176954	0.2147638
-0.80	0.2118553	0.2089700	0.2061080	0.2032693	0.2004541	0.1976625	0.1948945	0.1921502	0.1894296	0.1867329
-0.90	0.1840601	0.1814112	0.1787864	0.1761855	0.1736088	0.1710561	0.1685276	0.1660232	0.1635431	0.1610871
-1.00	0.1586553	0.1562477	0.1538642	0.1515050	0.1491700	0.1468591	0.1445723	0.1423097	0.1400711	0.1378566
-1.10	0.1356661	0.1334996	0.1313569	0.1292382	0.1271432	0.1250720	0.1230245	0.1210005	0.1190002	0.1170233
-1.20	0.1150697	0.1131395	0.1112325	0.1093486	0.1074878	0.1056498	0.1038347	0.1020424	0.1002726	0.0985254
-1.30	0.0968005	0.0950980	0.0934176	0.0917592	0.0901227	0.0885081	0.0869150	0.0853435	0.0837934	0.0822645
-1.40	0.0807567	0.0792699	0.0778039	0.0763586	0.0749337	0.0735293	0.0721451	0.0707809	0.0694367	0.0681121
-1.50	0.0668072	0.0655217	0.0642555	0.0630084	0.0617802	0.0605708	0.0593800	0.0582076	0.0570534	0.0559174
-1.60	0.0547993	0.0536989	0.0526161	0.0515507	0.0505026	0.0494715	0.0484572	0.0474597	0.0464786	0.0455139
-1.70	0.0445654	0.0436329	0.0427162	0.0418151	0.0409295	0.0400591	0.0392039	0.0383635	0.0375379	0.0367269
-1.80	0.0359303	0.0351478	0.0343794	0.0336249	0.0328841	0.0321567	0.0314427	0.0307418	0.0300540	0.0293789
-1.90	0.0287165	0.0280665	0.0274289	0.0268033	0.0261898	0.0255880	0.0249978	0.0244191	0.0238517	0.0232954
-2.00	0.0227501	0.0222155	0.0216916	0.0211782	0.0206751	0.0201821	0.0196992	0.0192261	0.0187627	0.0183088
-2.10	0.0178644	0.0174291	0.0170030	0.0165857	0.0161773	0.0157776	0.0153863	0.0150034	0.0146287	0.0142621
-2.20	0.0139034	0.0135525	0.0132093	0.0128737	0.0125454	0.0122244	0.0119106	0.0116038	0.0113038	0.0110106
-2.30	0.0107241	0.0104441	0.0101704	0.0099031	0.0096418	0.0093867	0.0091375	0.0088940	0.0086563	0.0084242
-2.40	0.0081975	0.0079763	0.0077603	0.0075494	0.0073436	0.0071428	0.0069469	0.0067557	0.0065691	0.0063872
-2.50	0.0062097	0.0060366	0.0058678	0.0057031	0.0055426	0.0053862	0.0052336	0.0050850	0.0049400	0.0047988
-2.60	0.0046612	0.0045271	0.0043965	0.0042693	0.0041453	0.0040246	0.0039071	0.0037926	0.0036812	0.0035726
-2.70	0.0034670	0.0033642	0.0032641	0.0031668	0.0030720	0.0029798	0.0028901	0.0028029	0.0027180	0.0026355
-2.80	0.0025552	0.0024771	0.0024012	0.0023275	0.0022557	0.0021860	0.0021183	0.0020524	0.0019884	0.0019263
-2.90	0.0018659	0.0018072	0.0017502	0.0016949	0.0016411	0.0015889	0.0015383	0.0014891	0.0014413	0.0013950
-3.00	0.0013500	0.0013063	0.0012639	0.0012228	0.0011830	0.0011443	0.0011068	0.0010704	0.0010351	0.0010009