Section 1: General

1. The scheduling rule that minimizes the makespan time for a set of jobs that must be processed through a two-step system where every job follows the same sequence through the two processes is
   a. the shortest processing time.
   b. the assignment method.
   c. Johnson Rule.
   d. the minimal slack rule.

2. Which of the following topics related to O&SCM was not covered in the course in detail:
   a. QFD
   b. SPC
   c. Production Planning
   d. MRP

   b ; SPC involves control charts and quality related things.

3. Which of the following factors does NOT affect the makespan in a sequencing problem?
   a. The sequence in which jobs are processed ✓
   b. The processing times of each job on each machine —
   c. The number of jobs to be processed —
   d. The time taken by the machine for setup between jobs ←

   a

4. Which of the following is an output of MRP
   a. Master production schedule
   b. Planned order releases
   c. Item master file
   d. Product structure file

   b

5. Perceptual Maps are used in which stage of design process:
   a. Prototyping
   b. Feasibility Analysis
   c. None of the above
   d. Ideation

   d => perpetual maps are used in Idea generation phase.

6. Material Requirement Planning (MRP) is primarily used to:
   a. Manage inventory levels and production schedules.
   b. Determine the profitability of products.
   c. Monitor employee performance.
   d. Forecast future demand for products.

   a

7. Which of the following is NOT an objective of scheduling in production management?
   a. Maximize machine and labor utilization.
   b. Meet delivery deadlines.
   c. Eliminate all forms of inventory.
   d. Minimize production time.

   c

8. Which of the following is not the correct expansion of the acronym:
   a. ERP: Enterprise Resource Procurement
   b. CRP: Capacity Requirement Planning
   c. MRP: Material Requirement Planning
   d. EOQ: Economic Order Quantity

   a => ERP is enterprise resource planning

9. Load profile is an output of the Capacity Requirement Planning?
   a. True
   b. False

   a => output of CRP is load profiles for each processes.

10. QFD stands for:
    a. Quality Form Definition
    b. Quality failure Detention
    c. Quality Function Deployment

    c

d. None of the above

11. Which of the following best describes the Pareto Principle?
    a. It prioritizes problem solving efforts based on the significance of each issue
    b. It focuses on maximizing productivity by minimizing wasted time
    c. It suggests that every problem has a solution
    d. It emphasizes the importance of teamwork in problem solving

a

12. In Material Requirement Planning (MRP), lead time refers to:
    a. The time required to produce an item.
    b. The time required to manufacture and transport an item.
    c. The time between ordering an item and receiving it.
    d. The total time taken to assemble a product.

c

13. Inter arrival time is usually modelled using which distribution:
    a. Exponential
    b. Deterministic
    c. General
    d. None of the above

a

14. Consider a service system with an average arrival rate of 4 customers per hour. If the average number in the system is 20, the average waiting time in the system will be (Hint: Use Little's law)
    a. 4.8 hours
    b. 5 hours
    c. 4.6 hours
    d. 4.4 hours

$$\lambda = 4/hr$$

15. Which of the following is not a block in QFD:
    a. Design targets ✓
    b. Operating instructions
    c. Tradeoff matrix ✓
    d. Competition analysis ✓

b

16. The extent to which the firm will produce the inputs and control the outputs of each stage of the production process is known as:
    a. Vertical Integration
    b. Process Planning
    c. Capital Intensity
    d. Process Flexibility

a

17. If a job has the shortest processing time on the second machine in Johnson's rule, where is it placed in the sequence
    a. At the end of the sequence
    b. Any of the above
    c. At the middle of the sequence
    d. At the beginning of the sequence

a

18. In a single server queuing system, the utilization factor (Rho) is given by:
    a. lambda*mu
    b. 1 minus lambda/mu
    c. mu/lambda
    d. lamba/mu

d

19. Which of the following is not a disadvantage of using the ABC analysis method in inventory management.
    a. It ignores the interdependency of items in a supply chain.
    b. It fails to account for items that may be critical to production, even if their value is low.
    c. It assumes that demand for each item is constant over time.
    d. It can be time consuming to classify all items into A, B, and C categories. ✓

d

20. Which of the following is not a block in QFD:
    a. Competition analysis
    b. Tradeoff matrix
    c. Operating instructions ✓

c

$$B \quad L = \frac{\lambda}{\mu - \lambda} = 20$$

$$\Rightarrow \frac{4}{\mu - 4} = 20$$

$$\Rightarrow 4 = 20\mu - 8$$

$$\Rightarrow 84 = 20\mu$$

$$\Rightarrow \mu = \frac{84}{20}$$

$$\mu = 4.2$$

$$W = \frac{1}{\mu - \lambda}$$

$$= \frac{1}{0.2}$$

value / qty

d. Design targets

21. The _____ is a lot sizing technique that orders for multiple demand periods is referred to as
    a. Multiple order quantity (MOQ)
    b. Periodic order quantity (POQ)
    c. Lot for lot (L4L)
    d. Economic order quantity(EOQ)

    b

22. Which of the following topics was not covered in the course:
    a. Johnson's algorithm
    b. Production Flow Analysis
    c. Generalized Linear Programming
    d. Material Requirement Planning

    b

23. Item master file is in input to the Material Requirement Planning?
    a. False
    b. True

    b

24. Consider a service system with an average arrival rate of 5 customers per hour. If the average number in the system is 23. what will be the average waiting time in the queue, assuming there is only one server in the system?
    a. 5.2 hours
    b. 4.8 hours
    c. 4.6 hours
    d. 4.4 hours

    d

25. Which of the following is NOT an input required for Material Requirement Planning (MRP)?
    a. Bill of Materials (BOM)
    b. Master Production Schedule (MPS)
    c. Profit and Loss Statement
    d. Inventory Data

    c

26. The scheduling rule that minimizes the makespan time for a set of jobs that must be processed through a two step system where every job follows the same sequence through the two processes is
    a. the shortest processing time
    b. Johnson's Rule.
    c. the assignment method.
    d. the minimal slack rule.

    b

27. Output of the feasbility analysis in the design process is:
    a. form design
    b. Design Spec
    c. Performance Spec
    d. Prototype

    c

28. If the actual and forecasted demand for 3rd week is 580 and 600 units repectively and alpha = 0.2. Using the exponential smoothing method ,the forecast for the 4th week will be .... units.
    a. 598
    b. 596
    c. 568
    d. 600

    b

29. Which lot sizing technique in MRP orders the exact amount needed each period?
    a. Periodic Order Quantity (POQ)
    b. Economic Order Quantity (EOQ)
    c. Fixed Order Quantity (FOQ)
    d. Lot-for-Lot (L4L)

    d

30. Generally, which of the following O&SC processes add the highest value a) Marketing and Branding b) Manufacturing c) Design d) Assembly
    a. b
    b. c and a

    b

(Handwritten notes in right margin:)

Master Production schedule

Item Master File

product Bom

structure

$\lambda = 5$ planned orders Release

$W = \frac{}{}$

$\frac{\lambda}{\mu(\mu-\lambda)}$

$\frac{\lambda}{\mu - \lambda} = 23$

$\frac{5}{\mu - 5} = 23$

$5 = 23\mu - 115$

$\mu = 5.217$

$\frac{\lambda}{\mu(\mu-\lambda)} = \frac{5}{5.217 \times 0.217}$

$\alpha = 0.2$

3rd   580   600

$$\frac{\lambda^x e^{-\lambda x}}{x!} \qquad P\left(x < \frac{1}{\lambda}\right) =$$

c. a and b
d. d

31. Arrival rate at a service counter is poisson distributed with mean lambda. What fraction of the arrivals will arrive before the mean inter arrival time:
 a. .37
 b. .63
 c. lambda
 d. 1/lambda

$$\frac{1}{\lambda} \qquad \boxed{x = u -} \qquad \begin{cases} x\lambda e^{-\lambda x} \\ \int_0^\infty \\ \lambda \cdot \int_{-\infty}^\infty x e^{-\lambda x} \\ \left[\int x e^{-\lambda x}\right] \end{cases}$$

b

c

$$\frac{x e^{-\lambda x}}{-\lambda} - \int e^{-\lambda}$$

32. In the assignment problem, the Hungarian method is used to
 a. Determine the shortest path in a network
 b. Calculate the maximum flow in a system
 c. Find the optimal allocation of tasks to resources.
 d. Solve problems involving multiple transportation routes.

33. Which of the following is the last stage of planning before production starts:
 a. CRP
 b. APP
 c. Scheduling
 d. MRP

c

34. A company uses a 3 month weighted moving average method for forecasting. The following weights are assigned to the past months: 0.1 for the oldest month, 0.3 for the middle month, and 0.6 for the most recent month. The demand for the last three months was:Month 1: 250 units Month 2: 300 units Month 3: 350 units
 a. 300
 b. 220
 c. 315
 d. 325

d

35. Fundamental problem of O&SCM is
 a. Demand and supply are not collocated
 b. Demand and supply are coincidental in time
 c. Demand and supply are not coincidental in time
 d. Demand and supply are not relevant
 a) a& c)
 b) All of the above
 c) c& d)
 d) b& d)

$$1 - P\left(x > \frac{1}{\lambda}\right)$$

a $$1 - \int e^{-\lambda x}$$

36. What is the Johnson Rule used for in operations management?

 a. Scheduling production tasks
 b. Calculating economic order quantity
 c. Analyzing supply chain efficiency
 d. Optimizing inventory levels

a

37. Which of the following statement is correct?

 a. Operations management designs, operates, and improves marketing systems.
 b. The systematic analysis of work methods is known as operations research.
 c. An operations manager benefits from an integrated view of business organizations.
 d. The four primary functional areas of a firm are marketing, finance, operations, and legal.

c

Operations management focuses on internal processes related to production and delivery, not marketing systems.

Operations research uses mathematical and statistical methods to solve complex decision-making problems within organizations.

While many businesses recognize marketing, finance, and operations as core functions, some models include additional areas like human resources or research and development. Additionally, "legal" is typically considered a separate supporting function rather than a primary area of business operation

38. QFD is a method used to:

 a. Translate customer requirements into technical specifications.
 b. Analyze financial performance.
 c. Improve employee productivity.

a

d. Optimize manufacturing cost.

39. Which of the following technique used for forecasting .
    a. Exponential Smoothing
    b. All of the Above
    c. PERT/CPM
    d. Gantt Chart

40. The extent to which the firm will produce the inputs and control the outputs of each stage of the production process is known as:
    a. process flexibility
    b. vertical integration
    c. process planning
    d. capital intensity.

41. Fundamental problem of O&SCM is a) Demand and supply are not collocated b) Demand and supply are coincidental in time c) Demand and supply are not coincidental in time d) Demand and supply are not relevant
    a. b and d
    b. a and c
    c. All Of The Above
    d. c and d

42. POQ in MRP stands for
    a. Periodic Order Quantity
    b. Production Order Quantity
    c. Period outstanding Quantity
    d. Perfect Order Quantity

43. In a sequencing problem where the objective is to minimize makespan, how does the order of jobs affect the total completion time on multiple machines?
    a. The order only matters if the jobs are processed on parallel machines
    b. The order of jobs can significantly affect the total completion time
    c. The order has no effect on the total completion time
    d. The order affects only the processing time of the first machine

44. Which of the following inputs is NOT required for Material Requirement Planning (MRP)?
    a. Inventory Records
    b. Financial Statements
    c. Bill of Materials (BOM)
    d. Master Production Schedule (MPS) Req.

45. Probability of an Idle System for a single stage single channel queue is
    a. Rho
    b. 1+Rho
    c. lambda/mu
    d. 1−Rho

46. Arrival rate at a service counter is poisson distributed with mean lambda. The mean interarrival time would be
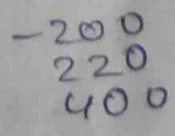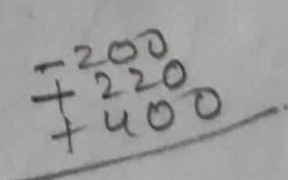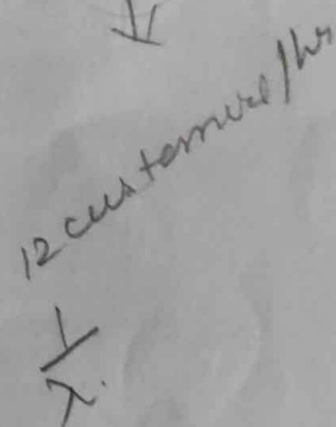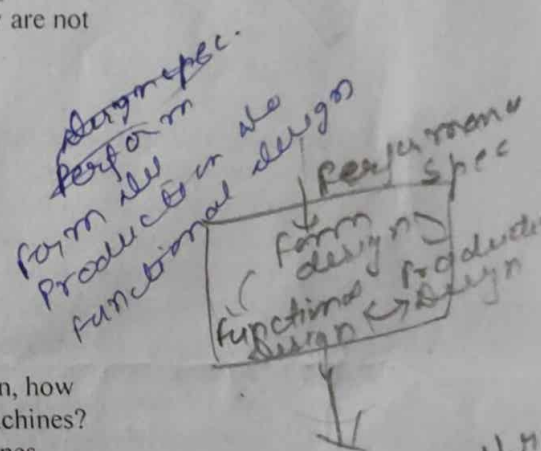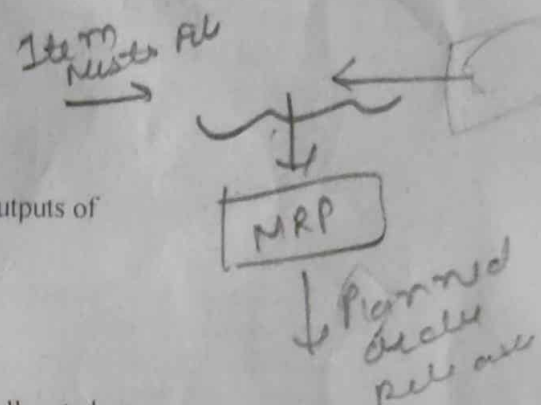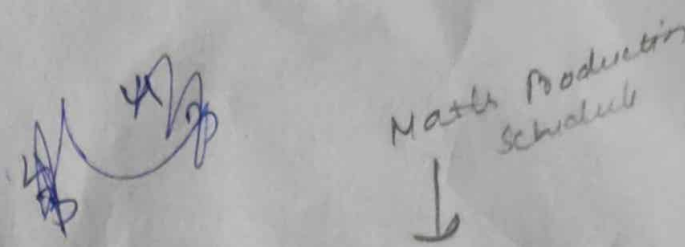   a. 1/lambda
    b. lambda
    c. can't say
    d. None of the above

47. A shopkeeper for mobiles forecast the demand at the rate of 1200 per month for the next three months. The actual demand turned out to be 1000, 1420 and 1600. The bias of the forecast will be ....units.
    a. 160
    b. 150
    c. 145
    d. 140

48. A company forecasts demand for a product using a 4 month weighted moving average method. The following sales data was given for the last 4 months: Month 1: 250 units Month 2: 300 units Month 3: 350 units Month 4: 400 units. The weights assigned to the past months are 0.4,0.3,0.2,0.1.Giving Higher weight to most recent months. What is the forecast for the next month (Month 5)?

a. 380
b. 390
c. 400
d. 370

answer is 350; so mark d

350

250	0.1
300	0.2
350	0.3
400	0.4

= 350

49. A company uses a 5 month moving average technique to forecast sales. The new forecast for june is …………..thousand. (Actual demand for month of december 320, feb 360, may350) (Forecasted demand in thousands for the month of feb 380 ,april 350 , may 340)

a. 340
b. 346
c. 348
d. 347

b

Dec. 320

Jan. —

Feb 360   380

Mar. —

1Apr   350

May 350   340

Jun

50. In exponential smoothing method of forecasting, the forecast for higher values of the smoothing constant?
a. will be more sensitive to forecast of the previous period
b. will not be affected by the forecast of the previous period
c. will be more sensitive to changing patterns in demand
d. will not be affected by the changing patterns in demand

c

51. The _____ is a lot sizing technique that orders for multiple demand periods is referred to as
a. Multiple order quantity (MOQ)
b. Periodic order quantity (POQ)
c. Economic order quantity(EOQ)
d. Lot for lot (L4L)

b

$$340 = \frac{Apr + May + 360 + Jan + 320}{5}$$

52. Which of the following is an output of MRP?
a. Product structure file
b. Master production schedule
c. Planned order releases
d. Item master file

c

53. A Gantt chart is used in scheduling to:
a. Identify the causes of quality defects.
b. Calculate the cost of production activities.
c. Optimize inventory levels.
d. Visualize the sequence and timing of tasks.

d

350

54. A company uses exponential smoothing to forecast demand. The previous period's forecast was 200 units, and the actual demand was 220 units. If the smoothing constant (alpha) is 0.4, what is the forecast for the next period?
a. 218
b. 215
c. 220
d. 210

208

208 => mark d

$$0.4 \times 220 + 0.6 \times 20$$

55. A factory has 4 jobs, and they are to be processed on two machines. The processing times (in minutes) are as follows: (JobNo., Processing time on M1, Proceesing time on M2) (1,6,4), (2,3,8), (3,5,7), (4,2,6), Using Johnson's rule, which sequence of jobs minimizes the makespan?
a. 4123
b. 2431
c. 4231
d. 4213

c

Job No	M1	M2
1	6	4
2	3	8
3	5	7
4	2	6

4 2 3 1

56. Which of the following best describes a Bill of Materials (BOM)?

a. A document outlining safety procedures in the workplace.
b. A list of financial transactions related to production.
c. A comprehensive list of components and quantities needed to manufacture a product.
d. A report detailing employee performance metrics

57. Which of the following statements is correct:
    a. DDATE does not yield the minimum tardiness.
    b. Slack rule is the optimal rule for sequencing
    c. FIFO is the optimial rule for sequencing
    ✓ SPT will always yield the lowest mean completion time

58. Which distribution is usually used to model the arrival rate
    a. Deterministic
    b. Poisson
    c. None of the above
    d. Exponential

59. If the optimal assignment in an assignment problem results in multiple solutions, it implies:
    a. The Problem is infeasible
    b. The Hungarian method cannot be applied
    c. Costs are inconsistent
    d. There are alternative optimal solutions

60. Operations and Supply Chain Management (O&SCM) focuses on:
    a. Optimizing the flow of goods, services, and information from suppliers to customers.
    b. Managing employee performance.
    c. Conducting market research and advertising campaigns.
    d. Developing financial strategies for businesses.

Section 2: MRP:

ITEM: D				Period			
Lot Size: Min 100	1	2	3	4	5	6	7
LT: 2							
Gross Requirements	60	90	150	150	180	270	120
Schedule Receipts		150					
Project on Hand 120	120	60	120	70	20	0	0	6
Net Requirements	0	0	30	80	160	270	120
Planned Order Receipts			100	100	160	270	120
Planned Order Releases	100	100	160	270	120		

Q 1 The planned order release for period 3 is
    a. 100.
    b. 160.
    c. 270.
    d. 300.

Q 2 The planned order release for period 5 is
    a. 100.
    b. 120.
    c. 160.
    d. 270.

Q3. The planned order receipt for period 6 is
    a. 100.
    b. 120.
    c. 160.

✓ 270.

Q4 The projected on hand quantity at the end of period 3 is
   a. 0.
   b. 20.
   c. 60.
 ✓ d. 70.

d

Section 3: Scheduling

Product	Machine			
	A	B	C	D
1	10	9	16	12
2	8	14	17	5
3	19	20	11	7
4	8	18	5	10

Four products (1, 2, 3, and 4) must be processed on one of four machines (A, B, C, and D). The times required in minutes for each product on each machine are shown below.
1. If management wishes to assign products to machines so that the total time to complete all the products is minimized, then Product 1 is assigned to   b
  a) machine A   b) machine B.   c) machine C.   d)machine D.
2. If management wishes to assign products to machines so that the total time to complete all the products is minimized, then Product 3 is assigned to   d
  a) machine A   b) machine B.   c) machine C.   d)machine D.
3. If management wishes to assign products to machines so that the total time to complete all the products is minimized, then Product 4 is assigned to   c
  a) machine A   b) machine B.   c) machine C.   d)machine D.
4. If management assigns products to machines so that the total time to complete all jobs is minimized, then the time to complete Product 1 is   b
  a. 10 minutes.   b) 9 minutes.   c)16 minutes.   d)12 minutes
5. The minimum time required to complete all the products is   a
  a) 29 minutes.   b) 27 minutes.   c)33 minutes.   d)36minutes.

D
H
E
B
G
A
C
F

Section 4 Sequencing

The following set of jobs are to be processed on a single machine.

Jobs	A	B	C	D	E	F	G	H
Processing Time	14	10	17	6	9	19	15	8
Due Date	42	82	91	71	48	74	58	62

1. Which of the following is correct sequence using SPT.

  a) B → D → A → H → G → C → F   b) D → H → C → A → B → G → F   c
  c) D → H → B → A → G → C → F   d) H → A → D → B → C → G → F

2. Avearge tardiness per job (up to three decimal point).   4.125
  a) 3.625   b) 3.680   c) 3.620   d)3.630 **4.125** ✓
3. Using the Shortest Processing Time (SPT) rule, choose the correct makespan time from the options below.   98 => d
  a) 100   b)102   c)99   d)98 ✓
4. Average job flow time per job .(Accuracy Upto Two Decimal Places) (SPT)   a => total C.T / 8
  a)45.25   b)42.25   c)46.25   d)46
5. Number of tardy jobs. Using SPT
  a) 4(A,G,E,B)   b)3 (B,A,D)   c) 4 (G,D,A,B)   d)3(A,G,E)   A,G,F

3 (A, G, F) ✓

Section 5: Jhonsons Rule

There are seven jobs, each of which has to go through the machines A and B in the order AB. Processing times in hours are as follows.

Jobs	1	2	3	4	5	6	7
Machine A	3	12	15	6	10	11	9
Machine B	8	10	10	6	12	1	3

1. Determine a sequence of these jobs that will minimize the total elapsed time using Jhonson's Rule.
a) 1543276   b) 1432567   c) 1742536   d) 1453276

2. Minimum, Elapsed time for the above chosen sequence.
a) 76 Hours   b) 68 Hours   c) 67 Hours   d) 70 Hours

3. Idle Time For Machine A.
a) 1 Hour   b) 2 Hours   c) 6 Hours   d) 5 Hours

4. Idle Time For Machine B
a) 15 Hours   b) 19 Hours   c) 18 Hours   d) 17 Hours

5. Sequencing is a subset of...........
a) Expediting   b) Routing   c) Scheduling   d) All Of Them

Section 6: Assignment Problem

Q. Solve the following assignment problem shown in the Table using Hungarian method. The matrix entries are the processing time of each Job to each machine in hours.

J/M	I	II	III	IV	V
1	9	22	58	11	19
2	43	78	72	50	63
3	41	28	91	37	45
4	74	42	27	49	39
5	36	11	57	22	25

1. Which of the method is used to solve Assignment problem ....
a) Stepping Stone Method   b) Hungarian Method
c) Vogels Approxiation   d) North-West corner

2. The assignment made in the final optimal solution for the first row is ....
a) 22   b) 19   c) 9   d) 11

3. The assignment made in the final optimal solution for the Fifth row is.........
a) 25   b) 36   c) 11   d) 57

4. The optimal solution z in Hours.................
a) 130   b) 132   c) 134   d) 136

5. In an assignment problem involving 5 workers and 5 jobs, total number of assignments possible are
a) 5!   b) 10   c) 25   d) 5.

Section 7 Queuing

At a telephone booth, arrivals are assumed to follow Poisson distribution with average time of 10 minutes between two calls. The average length of a telephone call is 4 minutes and it is assumed to be exponentially distributed.

1. Average number of calls (customers) in the system.
a) 0.668   b) B) 0.669   c) 0.667   d) 0.700

2. Average number of callers waiting to be served.
a) 0.267   b) 0.270   c) 0.288   d) 0.300

3. Average waiting time of a caller before being served.
a) 2.50   b) 2.67   c) 2.87   d) 2.00

c

4. Probability of at least one customer in the booth
a) 0.5 b) 0.6 c) 0.4 d) 0.35

a

5. Fraction of time during which booth is empty.
a) 0.6 b) 0.4 c) 0.45 d) 0.65

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.00005	.00005	.00004	.00004	.00004	.00004	.00004	.00004	.00003	.00003
-3.8	.00007	.00007	.00007	.00008	.00006	.00006	.00006	.00005	.00005	.00005
-3.7	.00011	.00010	.00010	.00010	.00009	.00009		.00008	.00008	.00008
-3.6	.00016	.00015	.00015	.00014	.00014	.00013		.00012	.00012	.00011
-3.5	.00023	.00022	.00022	.00021	.00020	.00019		.00018	.00017	.00017
-3.4	.00034	.00032	.00031	.00030	.00029	.00028	.00027	.00026	.00025	.00024
-3.3	.00048	.00047	.00045	.00043	.00042	.00040	.00039	.00038	.00036	.00035
-3.2	.00069	.00066	.00064	.00062	.00060	.00058	.00056	.00054	.00052	.00050
-3.1	.00097	.00094	.00090	.00087	.00084	.00082	.00079	.00076	.00074	.00071
-3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100
-2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
-2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
-2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
-2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
-2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
-2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
-2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
-2.2	.01390	.01355	.01321	.01287	.01255	.01222		.01160	.01130	.01101
-2.1	.01786	.01743	.01700	.01659	.01618	.01578		.01500	.01463	.01426
-2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
-1.9	.02872	.02807	.02743	.02680	.02619	.02559	.02500	.02442	.02385	.02330
-1.8	.03593	.03515	.03438	.03362	.03288	.03216	.03144	.03074	.03005	.02938
-1.7	.04457	.04363	.04272	.04182	.04093	.04006	.03920	.03836	.03754	.03673
-1.6	.05480	.05370	.05262	.05155	.05050	.04947	.04846	.04746	.04648	.04551
-1.5	.06681	.06552	.06426	.06301	.06178	.06057	.05938	.05821	.05705	.05592
-1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
-1.3	.09680	.09510	.09342	.09176	.09012	.08851	.08691	.08534	.08379	.08226
-1.2	.11507	.11314	.11123	.10935	.10749	.10565	.10383	.10204	.10027	.09853
-1.1	.13567	.13350	.13136	.12924	.12714	.12507	.12302	.12100	.11900	.11702
-1.0	.15866	.15625	.15386	.15151	.14917	.14686	.14457	.14231	.14007	.13786
-0.9	.18406	.18141	.17879	.17619	.17361	.17106	.16853	.16602	.16354	.16109
-0.8	.21186	.20897	.20611	.20327	.20045	.19766	.19489	.19215	.18943	.18673
-0.7	.24196	.23885	.23576	.23270	.22965	.22663	.22363	.22065	.21770	.21476
-0.6	.27425	.27093	.26763	.26435	.26109	.25785	.25463	.25143	.24825	.24510
-0.5	.30854	.30503	.30153	.29806	.29460	.29116	.28774	.28434	.28096	.27760
-0.4	.34458	.34090	.33724	.33360	.32997	.32636	.32276	.31918	.31561	.31207
-0.3	.38209	.37828	.37448	.37070	.36693	.36317	.35942	.35569	.35197	.34827
-0.2	.42074	.41683	.41294	.40905	.40517	.40129	.39743	.39358	.38974	.38591
-0.1	.46017	.45620	.45224	.44828	.44433	.44038	.43644	.43251	.42858	.42465
-0.0	.50000	.49601	.49202	.48803	.48405	.48006	.47608	.47210	.46812	.46414