Florida Gateway College Mathematics Department

MGF 1106 Final Exam Review

Formulas and Conversions:

1 mi = 1.6 km, 1 in = 2.54 cm, 1 kg = 2.2 lbs, 1 yard = 0.9 m, 1 foot = 30.48 cm, $F = \frac{9}{5}C + 32$, $C = \frac{5}{9}(F - 32)$

$V_{cylinder} = \pi r^2 h$, $V_{cone} = \frac{1}{3}\pi r^2 h$, $V_{pyramid} = \frac{1}{3}Bh$, $V_{sphere} = \frac{4}{3}\pi r^3$, ${}_nP_r = \frac{n!}{(n-r)!}$, ${}_nC_r = \frac{n!}{(n-r)!r!}$

PART 1: Multiple Choice. Circle the best answer to each problem.

1) Inductive reasoning is the process of reasoning to a general conclusion:

A) through observations of specific cases. B) from a general statement.

2) Deductive reasoning is the process of reasoning to a specific conclusion:

A) through observations of specific cases. B) from a general statement.

Identify a pattern in the list of numbers. Then use this pattern to find the next number.

3) 37, 31, 25, 19, 13

A) 0 B) 2 C) 7 D) 6

4) 7, –28, 112, –448, 1792

A) –3136 B) –7168 C) 3136 D) 7168

Calculate the number of subsets and the number of proper subsets for the set.

5) $\{\frac{1}{6}, \frac{1}{7}, \frac{1}{8}, \frac{1}{9}\}$

A) 15; 14 B) 15; 16 C) 16; 15 D) 14; 15

6) {x | x is a day of the week}

A) 127; 126 B) 64; 65 C) 128; 127 D) 128; 129

List all the subsets of the given set.

7) {4}

A) {4}, { } B) {0}, {4}, { } C) { } D) {4}

8) {m, n}.

A) {m}, {n}, {m, n}, ∅ B) {m}, {n}, ∅

C) {m}, {n} D) {m}, {n}, {m, n}

Decide whether ⊆, ⊂, both, or neither can be placed in the blank to make a true statement.

9) {15, 16, 17} __ {15, 16, 17}

A) ⊂ B) ⊆ C) Both ⊂ and ⊆ D) Neither

10) {a, b} __ {z, a, y, b, x, c}

A) Both ⊂ and ⊆ B) ⊆ C) ⊂ D) Neither

Are the sets equivalent?

11) A = {14, 15, 16, 17, 18}
B = {13, 14, 15, 16, 17}

A) Yes B) No

Are the sets equal?

12) {16, 18, 20, 22, 24} = {18, 20, 22, 24}

A) Yes B) No

13) Set A contains 12 letters and 8 numbers. Set B contains 7 letters and 8 numbers. Four letters and 5 numbers are common to both sets A and B. Find the number of elements in set A or set B.

A) 29 B) 26 C) 44 D) 35

14) Set A contains 35 elements and set B contains 22 elements. If there are 40 elements in $(A \cup B)$ then how many elements are in $(A \cap B)$?

A) 5 B) 8 C) 13 D) 17

Write the negation of the quantified statement. (The negation should begin with "all," "some," or "no.")

15) All uncles are males.

A) Some uncles are not males.
B) All males are not uncles.
C) No uncles are not males.
D) Some males are not uncles.

16) No medicines have made people well.

A) Some medicines have not made people well.
B) All medicines have not made people well.
C) Some medicines have made people well.
D) All medicines have made people well.

The double-arrow in the following symbolic statement represents:

17) $p \leftrightarrow [(r \wedge q) \rightarrow (p \vee r)]$

A) if-then
B) if and only if
C) and/or
D) or

Given that p, q, and r ea ch represent a simple statement, write the indicated compound statement in its symbolic form.

18) p: The outside humidity is low.
q: The central humidifier is running.
r: The air in the house is getting dry.

The air in the house is getting dry, if and only if the outside humidity is low and the central humidifier is not running.

A) $r \leftrightarrow (p \wedge q)$
B) $(p \wedge q) \rightarrow r$
C) $r \leftrightarrow (p \wedge \sim q)$
D) $(r \leftrightarrow p) \wedge \sim q$

19) It is not the case that if the air in the house is getting dry, then the central humidifier is not running.

A) $\sim (r \wedge \sim q)$
B) $\sim r \rightarrow \sim q$
C) $\sim (r \rightarrow q)$
D) $\sim (r \rightarrow \sim q)$

Write the equivalent contrapositive of the statement.

20) If I am in the city of Jokdrifa, then I am on the planet Plochus.

A) If I am not in the city of Jokdrifa, then I am on the planet Plochus.
B) If I am not on the planet Plochus, then I am not in the city of Jokdrifa.
C) If I am not in the city of Jokdrifa, then I am not on the planet Plochus.
D) If I am not on the planet Plochus, then I am in the city of Jokdrifa.

21) If he is not working in China, then he is vacationing in England.

A) If he is working in China, then he is not vacationing in England.
B) If he is not vacationing in China, then he is working in England.
C) If he is not vacationing in England, then he is working in China.
D) If he is vacationing in China, then he is not working in England.

Write a negation of the statement.

22) She is not older than 21 and he is older than 21.

A) She is older than 21 but he is not older than 21.
B) She is older than 21 or he is not younger than 21.
C) It is not true that she is older than 21 or he is not older than 21.
D) She is older than 21 or he is not older than 21.

23) Roger or Emil will attend the game.
A) Roger and Emil will attend the game.
B) Roger or Emil will not attend the game.
C) Roger will not attend the game and Emil will not attend the game.
D) Roger will not attend the game and Emil will attend the game.

Convert the quantity to the indicated units. If necessary, round the answer to two decimal places.

24) 78 ft to yd
A) 2808 yd B) 26 yd C) 234 yd D) 8.67 yd

25) 7 ft to in.
A) 21 in. B) 28 in. C) 84 in. D) 252 in.

26) 58.09 m to dm
A) 5.809 dm B) 0.581 dm C) 5809 dm D) 580.9 dm

27) 18 cm to in.
A) 0.02 in B) 45.72 in C) 0.14 in D) 7.09 in

28) 1.7 dam to in.
A) 669.29 in. B) 4.32 in. C) 0.23 in. D) 0.67 in.

29) 42 kg to g
A) 0.42 g B) 4200 g C) 42,000 g D) 0.042 g

30) 7 g to cg
A) 0.07 cg B) 700 cg C) 70 cg D) 7000 cg

Convert the given Celsius temperature to its equivalent temperature on the Fahrenheit scale. Where appropriate, round to the nearest tenth of a degree.

31) –4°C
A) 24.8°F B) –39.2°F C) –20°F D) 29.8°F

Convert the given Fahrenheit temperature to its equivalent temperature on the Celsius scale. Where appropriate, round to the nearest tenth of a degree.

32) 536°F
A) 996.8°C B) 315.6°C C) 907.2°C D) 280°C

Solve the problem. Use 3.14 for π.

33) A wicker basket has a circular rim with a diameter of 11 inches. How many inches of ribbon are needed to go once around the rim? Round results to the nearest tenth of a unit.
A) 69.1 in. B) 34.5 in. C) 32.5 in. D) 121.0 in.

34) A circular fountain has a statue in its center, 8 m from the edge. What is the distance around the fountain? Round results to the nearest tenth of a unit.
A) 48.2 m B) 25.1 m C) 50.2 m D) 64.0 m

35) A square sheet of paper measures 28 centimeters on each side. What is the length of the diagonal of this paper?
A) 28 cm B) 56 cm C) 1568 cm D) 39.6 cm

36) If you drive 8 miles south, then make a left turn and drive 6 miles east, how far are you, in a straight line, from your starting point?

A) 10 mi B) 5.3 mi C) 1.4 mi D) 3.7 mi

37) There are 5 roads leading from Bluffton to Hardeeville, 7 roads leading from Hardeeville to Savannah, and 3 roads leading from Savannah to Macon. How many ways are there to get from Bluffton to Macon?

A) 105 B) 210 C) 15 D) 35

38) An apartment complex offers apartments with four different options, designated by A through D.

A = number of bedrooms (one through four)
B = number of bathrooms (one through three)
C = floor (first through fifth)
D = outdoor additions (balcony or no balcony)

How many apartment options are available?

A) 120 B) 240 C) 14 D) 16

Evaluate the factorial expression.

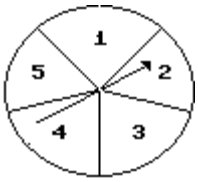
39) $\frac{600!}{597!}$

A) 600 B) 597 C) 214,921,200 D) 359,400

40) $\frac{10!}{5!\,5!}$

A) 1 B) 720 C) 252 D) 10

41) Use the spinner below to answer the question. Assume that it is equally probable that the pointer will land on any one of the five numbered spaces. If the pointer lands on a borderline, spin again.



Find the probability that the arrow will land on 2 or 4.

A) $\frac{3}{2}$ B) $\frac{2}{5}$ C) 2 D) $\frac{4}{3}$

42) A die is rolled. The set of equally likely outcomes is {1, 2, 3, 4, 5, 6}. Find the probability of getting a 7.

A) 1 B) 7 C) $\frac{7}{6}$ D) 0

43) To win at LOTTO in a certain state, one must correctly select 6 numbers from a collection of 53 numbers (one through 53.) The order in which the selections is made does not matter. How many different selections are possible?

A) 318 B) 20,358,520 C) 22,957,480 D) 720

44) From a group of 10 people, a committee of 3 will be selected for a trip. How many different committees are possible?

A) 720 B) 360 C) 120 D) 604,800

45) You are dealt one card from a 52 card deck. Then the card is replaced in the deck, the deck is shuffled, and you draw again. Find the probability of getting a picture card the first time and a diamond the second time.

A) $\frac{3}{52}$ B) $\frac{1}{13}$ C) $\frac{1}{4}$ D) $\frac{3}{13}$

46) There are 37 chocolates in a box, all identically shaped. There are 10 filled with nuts, 12 with caramel, and 15 are solid chocolate. You randomly select one piece, eat it, and then select a second piece. Find the probability of selecting 2 solid chocolates in a row.

A) $\frac{5}{444}$ B) $\frac{210}{1369}$ C) $\frac{35}{222}$ D) $\frac{225}{1369}$

47) A service that repairs televisions sells maintenance agreements for $11 a year. The average cost for repairing a television is $34 and 5 in every 100 people who purchase maintenance agreements have televisions that require repair. Find the service's expected profit per maintenance agreement.

A) $10.95 B) $9.64 C) $9.30 D) $10.66

48) An insurance company will insure a $220,000 home for its total value for an annual premium of $510. If the company spends $30 per year to service such a policy, the probability of total loss for such a home in a given year is 0.001 and you assume either total loss or no loss will occur, what is the company's expected annual gain (or profit) on each such policy?

A) $290 B) –$220 C) $260 D) $210

49) Martin scored 40 points on a quiz. The average score for his class was 39 with a standard deviation of 2.4. Martin's brother Jeff who is in a different class also had a quiz. He scored 29. The average score in Jeff's class was 26 with a standard deviation of 1.9. Find the z–score for each person. Relatively speaking, who did better?

A) 1.0, 3.0, Jeff B) 1.0, 3.0, Martin C) 0.42, 1.58, Jeff D) 0.42, 1.58, Martin

Solve the problem. Round results to the nearest hundredth.

50) The mean of a set of data is 283.20 and its standard deviation is 51.44. Find the z score for a value of 485.01.

A) 3.53 B) 3.92 C) 4.32 D) 4.22

51) The mean of a set of data is 4.78 and its standard deviation is 2.79. Find the z score for a value of 9.70.

A) 2.06 B) 1.58 C) 1.94 D) 1.76

Suppose that prices of a certain model of new homes are normally distributed with a mean of $150,000. Use the 68–95–99.7 rule to find the percentage of buyers who paid:

52) between $149,200 and $150,800 if the standard deviation is $800.

A) 68% B) 99.7% C) 95% D) 34%

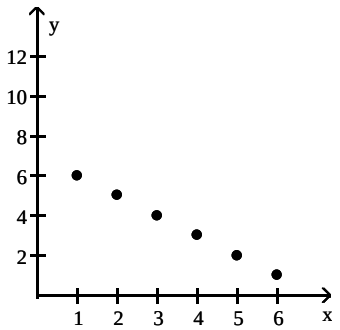
53) between $150,000 and $153,600 if the standard deviation is $1800.

A) 68% B) 34% C) 47.5% D) 99.7%

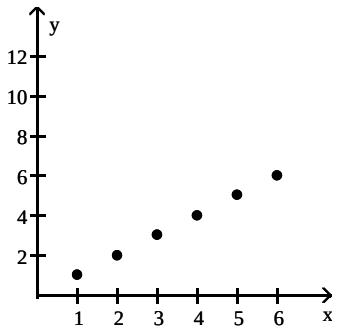
Use the scatter plots shown, labelled a through f to solve problems 53 and 54.

54)

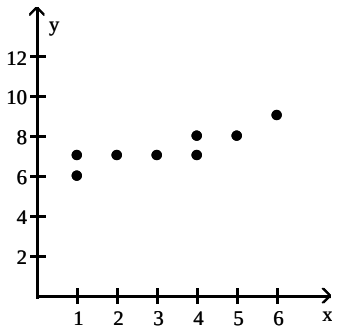
a



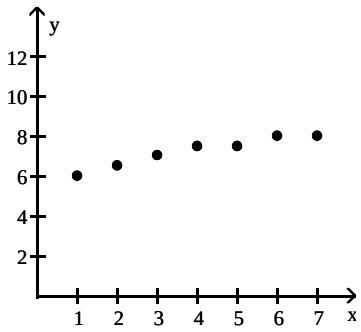
b



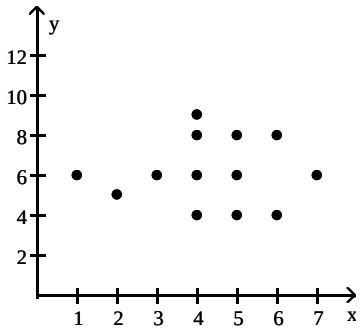
c



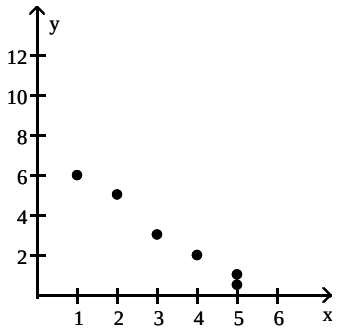
d



e



f



Which scatter plot indicates a perfect negative correlation?

A) c B) a C) b D) f

55) In which scatter plot is r = 0.01?

A) c B) e C) f D) d

PART 2: Free Response. Make sure you are able to show all work.

Solve the problem.

56) Mrs. Bollo's second grade class of thirty students conducted a pet ownership survey. Results of the survey indicate that 8 students own a cat, 15 students own a dog, and 5 students own both a cat and a dog. How many of the students surveyed own only a cat?

57) At East Zone University (EZU) there are 551 students taking College Algebra or Calculus. 210 are taking College Algebra, 389 are taking Calculus, and 48 are taking both College Algebra and Calculus. How many are taking Calculus but not Algebra? Create a Venn diagram to answer the question.

58) An anonymous survey of college students was taken to determine behaviors regarding alcohol, cigarettes, and illegal drugs. The results were as follows: 894 drank alcohol regularly, 665 smoked cigarettes, 192 used illegal drug, 424 drank alcohol regularly and smoked cigarettes, 114 drank alcohol regularly and used illegal drugs, 119 smoked cigarettes and used illegal drugs, 97 engaged in all three behaviors, and 309 engaged in none of the three behaviors.

Draw a Venn diagram to represent the results of the survey. (a) How many smoked cigarettes or drank alcohol regularly? (b) How many used illegal drugs only? (c) How many engaged in exactly two of these behaviors? (d) How many engaged in at least two of these behaviors?

59) In a survey of 280 people, a travel company asked people about places they plan to visit in the next 5 years. The results were as follows:
48 plan to visit Europe
58 plan to visit Latin America
34 plan to visit Asia
14 plan to visit Europe and Latin America
12 plan to visit Latin America and Asia
11 plan to visit Europe and Asia
4 plan to visit all three

Draw a Venn Diagram to represent the results of the survey. How many people plan to visit none of these places?

Let U = {q, r, s, t, u, v, w, x, y, z}
A = {q, s, u, w, y}
B = {q, s, y, z}
C = {v, w, x, y, z}. List the elements in the set.

60) $A \cap (B \cup C)$

61) $(A \cup B)' \cap C$

Construct a truth table for the statements.

62) $(p \wedge q) \vee (\sim p \wedge \sim q)$

63) $[\,(p \wedge q) \wedge (p \rightarrow q)\,] \leftrightarrow (p \vee q\,)$

Translate the argument into symbolic form, then use the table below to determine whether the argument is valid or invalid. Indicate valid/invalid and identify the type of answer.

VALID ARGUMENTS

Direct Reasoning	Contrapositive Reasoning	Disjunctive Reasoning		Transitive Reasoning
$p \to q$	$p \to q$	$p \vee q$	$p \vee q$	$p \to q$
p	$\sim q$	$\sim p$	$\sim q$	$q \to r$
———	———	———	———	———
$\therefore q$	$\therefore \sim p$	$\therefore q$	$\therefore p$	$\therefore p \to r$
				$\therefore \sim r \to \sim p$

INVALID ARGUMENTS

Fallacy of the Converse	Fallacy of the Inverse	Misuse of Disjunctive Reasoning		Misuse of Transitive Reasoning
$p \to q$	$p \to q$	$p \vee q$	$p \vee q$	$p \to q$
q	$\sim p$	p	q	$q \to r$
———	———	———	———	———
$\therefore p$	$\therefore \sim q$	$\therefore \sim q$	$\therefore \sim p$	$\therefore r \to p$
				$\therefore \sim p \to \sim r$

64) We will lower the drinking age or we will require three photo IDs.
We will not require three photo IDs.
∴ We will lower the drinking age.

65) If he wants to come, he will say so.
If he says so, then he will come.
∴ If he comes, that means he wants to.

Use an Euler diagram to determine whether the argument is valid or invalid.

66) All birds have feathers.
No mammal has feathers.
Therefore, no mammals are birds.

67) All dogs like food.
All pets like food.
Therefore, all dogs are pets.

68) All wrestlers are strong.
Some wrestlers are smart.
Therefore, some strong people are smart.

69) The speed limit in many neighborhoods is 35 miles per hour. How many kilometers per second is this?

70) Express 61 miles per hour in kilometers per second.

71) A building contractor is to dig a foundation 45 feet long, 25 feet wide, and 9 feet deep. The contractor pays $11 per load for trucks to remove the dirt. Each truckload holds 5 cubic yards. What is the cost to the contractor to have all the dirt hauled away?

72) A cubical container measures 2 yd on each edge. What does it cost to fill the container at $2.99 per cubic yd?

73) A new pyramid has been found in South America. The pyramid has a rectangular base that measures 51 yd by 200 yd, and has a height of 100 yd. The pyramid is not hollow like the Egyptian pyramids and is composed of layer after layer of cut stone. The stone weighs 420 lb per cubic yard. How many pounds does the pyramid weigh?

74) You are dealt one card from a 52–card deck. Find the probability that you are dealt a numbered card or a club

75) You are dealt one card from a 52–card deck. Find the probability that you are dealt an ace or a 8

Find the indicated percentile for the normally distributed variable.

76) At a local college, times for running the mile are approximately normally distributed with a mean of 4.5 minutes, and a standard deviation of 0.3 minutes. What is the percentage of randomly selected times that will be less than 4.2 minutes?

77) The lengths of human pregnancies are normally distributed with a mean of 268 days and a standard deviation of 15 days. What percentage of pregnancies lastsat least 301 days?

In the following three problems, consider what you have learned about measures of central tendency and measures of dispersion.

78) The mean salary of the female employees of one company is $29,525. The mean salary of the male employees of the same company is $33,470. Can the mean salary of all employees of the company be obtained by finding the mean of $29,525 and $33,470? Explain your thinking. Under what conditions would the mean of $29,525 and $33,470 yield the mean salary of all employees of the company?

79) Scores on the final exam for one MGF 1106 class had a standard deviation of 10 points. Scores on the final exam for a second MGF 1106 class had a standard deviation of 20 points. Without having access to the actual scores, what could we say about the differences between the two classes' scores? Assume the classes had a similar exam based on the same number of points.

80) The data set below consists of the scores of 15 students on a quiz. For this data set, which measure of variation do you think is more appropriate, the range or the standard deviation? Explain your thinking.

90 90 91 91 89 90 89 91 91 90 60 90 89 90 91

Determine if a correlation exists in the population for a significance level of 0.05. Then if it does, use the given data to find the best predicted value.

81) Eight pairs of data yield $r = 0.708$ and the regression equation $y = 55.8 + 2.79x$. What is the best predicted value of y for $x = 4.8$?

82) Six pairs of data yield $r = 0.789$ and the regression equation $y = 4x - 2$. What is the best predicted value of y for $x = 5$?

Answer Key
Testname: MGF 1106 EXAM REVIEW SPRING 2015

1) A
2) B
3) C
4) B
5) C
6) C
7) A
8) A
9) B
10) A
11) A
12) B
13) B
14) D
15) A
16) C
17) B
18) C
19) D
20) B
21) C
22) D
23) C
24) B
25) C
26) D
27) D
28) A
29) C
30) B
31) A
32) D
33) B
34) C
35) D
36) A
37) A
38) A
39) C
40) C
41) B
42) D
43) C
44) C
45) A
46) C
47) C
48) C
49) C
50) B
51) D
52) A
53) C
54) B
55) B
56) 3
57) 341
58) (a) 1135
(b) 56
(c) 366
(d) 463
59) 173
60) {q, s, w, y}
61) {v, x}
62)

p	q	$(p \wedge q) \vee (\sim p \wedge \sim q)$
T	T	T
T	F	F
F	T	F
F	F	T

63)

p	q	$p \wedge q$	$p \rightarrow q$	$(p \wedge q) \wedge (p \rightarrow q)$	$p \vee q$	final
T	T	T	T	T	T	T
T	F	F	F	F	T	F
F	T	F	T	F	T	F
F	F	F	T	F	F	T

64) valid; Disjunctive Reasoning
65) invalid; Misuse of Transitive Reasoning
66) valid
67) invalid
68) valid
69) 0.01556 km/sec
70) 0.02711 km/sec
71) $825
72) $23.92
73) 142,800,000 lb
74) $\frac{10}{13}$
75) $\frac{2}{13}$
76) 15.87%
77) 1.39%

78) In general, the mean salary of all employees of the company cannot be obtained by finding the mean of $29,525 and $33,470 because each of these means typically is obtained by averaging a different number of salaries for male and female employees. The mean of $29,525 and $33,470 will yield the mean salary of all employees of the company only if the number of female employees is equal to the number of male employees.
79) Since the second class had a much larger standard deviation, this would indicate that the scores were more spread out than in the first class. We can not say that one class did "better" than another class, but we can determine that the second class had a wider variety of low and high scores than the first class. We could go on to infer that the second classes' students had a wider range of mathematical knowledge.
80) For this data set, the range is very misleading. The range depends only on the smallest and largest values and the remainder of the data contributes nothing to the range. In this case, the smallest value is an far from the other values. Thus even though all the values except one lie between 89 and 91, the range is 31. The standard deviation, while it will also be affected by the very low value, will be less misleading, as it depends on every piece of data.
81) Correlation exists, predicted value = 69.19
82) Correlation does not exist.

TABLE 12.15 VALUES FOR DETERMINING CORRELATIONS IN A POPULATION

n	$\alpha = 0.05$	$\alpha = 0.01$
4	0.950	0.990
5	0.878	0.959
6	0.811	0.917
7	0.754	0.875
8	0.707	0.834
9	0.666	0.798
10	0.632	0.765
11	0.602	0.735
12	0.576	0.708
13	0.553	0.684
14	0.532	0.661
15	0.514	0.641
16	0.497	0.623
17	0.482	0.606
18	0.468	0.590
19	0.456	0.575
20	0.444	0.561
22	0.423	0.537
27	0.381	0.487
32	0.349	0.449
37	0.325	0.418
42	0.304	0.393
47	0.288	0.372
52	0.273	0.354
62	0.250	0.325
72	0.232	0.302
82	0.217	0.283
92	0.205	0.267
102	0.195	0.254

TABLE 12.13 *z*-SCORES AND PERCENTILES

z-Score	Percentile	*z*-Score	Percentile	*z*-Score	Percentile	*z*-Score	Percentile
−4.0	0.003	−1.0	15.87	0.0	50.00	1.1	86.43
−3.5	0.02	−0.95	17.11	0.05	51.99	1.2	88.49
−3.0	0.13	−0.90	18.41	0.10	53.98	1.3	90.32
−2.9	0.19	−0.85	19.77	0.15	55.96	1.4	91.92
−2.8	0.26	−0.80	21.19	0.20	57.93	1.5	93.32
−2.7	0.35	−0.75	22.66	0.25	59.87	1.6	94.52
−2.6	0.47	−0.70	24.20	0.30	61.79	1.7	95.54
−2.5	0.62	−0.65	25.78	0.35	63.68	1.8	96.41
−2.4	0.82	−0.60	27.43	0.40	65.54	1.9	97.13
−2.3	1.07	−0.55	29.12	0.45	67.36	2.0	97.72
−2.2	1.39	−0.50	30.85	0.50	69.15	2.1	98.21
−2.1	1.79	−0.45	32.64	0.55	70.88	2.2	98.61
−2.0	2.28	−0.40	34.46	0.60	72.57	2.3	98.93
−1.9	2.87	−0.35	36.32	0.65	74.22	2.4	99.18
−1.8	3.59	−0.30	38.21	0.70	75.80	2.5	99.38
−1.7	4.46	−0.25	40.13	0.75	77.34	2.6	99.53
−1.6	5.48	−0.20	42.07	0.80	78.81	2.7	99.65
−1.5	6.68	−0.15	44.04	0.85	80.23	2.8	99.74
−1.4	8.08	−0.10	46.02	0.90	81.59	2.9	99.81
−1.3	9.68	−0.05	48.01	0.95	82.89	3.0	99.87
−1.2	11.51	0.0	50.00	1.0	84.13	3.5	99.98
−1.1	13.57					4.0	99.997