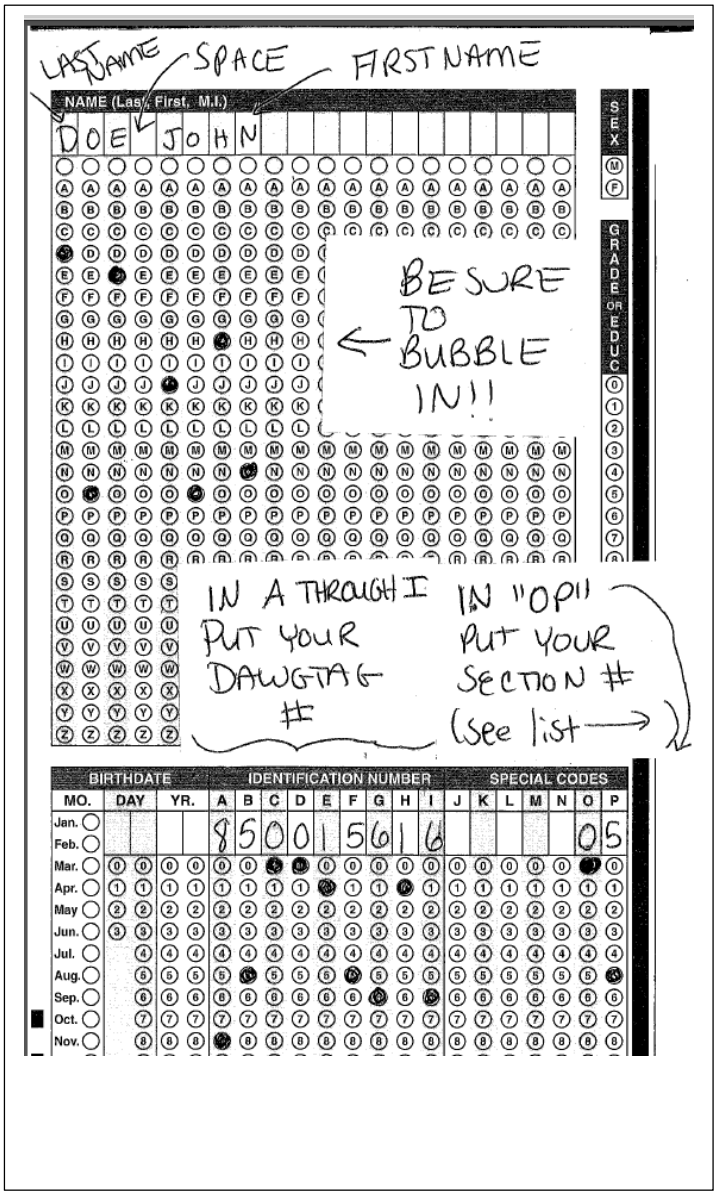
Math 101
Final Exam Spring 2017 **BLUE FORM**

Make sure that your scantron matches the color of this page. **Read <u>ALL</u> directions carefully before beginning the exam.**

- *Anyone found using a graphing/programmable calculator or cell phone during the final exam will receive a grade of "0".*
- *You may write on this exam. You may not use other paper unless you raise your hand and it is provided by an instructor.*
- *If you finish after 45 minutes, you can take this test with you. If you finish prior to 45 minutes, you will need to turn this test in along with your scantron.*
- *Please turn in your scantron to **<u>YOUR</u>** teaching assistant and have a picture ID ready.*
- On your scantron, encode your name as specified on the scantron, encode your Dawgtag as your "Identification Number," and encode your ***Section #*** "OP" under the area labeled "Special Codes."

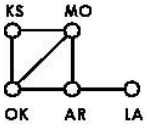
SAMPLE SCANTRON

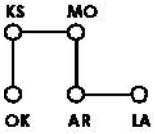


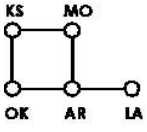
INSTRUCTOR/DAYS IS GIVEN:

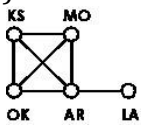
Sec	Days	Time	Instructor
1	WF	8-8:50	Pfister, Jamie
2	TR	9-9:50	Wijerathne, Menake
3	WF	9-9:50	Pfister, Jamie
4	WF	10-10:50	Parks, Christy
5	TR	11-11:50	Gharib, Alireza
6	TR	11-11:50	Parks, Christy
8	TR	12-12:50	Murphy, Charles
9	TR	1-1:50	Chandrasena, Shanika
11	WF	2-2:50	Elrifaei, Eman
12	TR	3-3:50	Chowdhury, Subhadeep
13	TR	4-4:50	Summers, Porter
15	WF	4-4:50	Herath, Bandara
17	TR	5-5:50	Athapattu, Chathurika
18	TR	5-5:50	Mobio, Bahoua
21	TWR	3-3:50	Liew, Jie Shi

1. Represent the picture with a graph, where vertices represent states, and edges represent whether or not two states share a border.

(A) 

(B) 

(C) 

(D) 

(E) None of these

2. Suppose that $6,000 is invested at 8% compounded quarterly. How much interest is earned after 2 years? First find the amount in the account and use it to find the interest.

(A) $ 960.00 (B) $1,029.96 (C) $2,073.60 (D) $7,029.96 (E) None of these

3. Use the 2012 FICA tax rates in the table below to solve the problem.

Employee's Rates	Matching Rates Paid by the Employer	Self-Employed Rates
5.65% on first $110,000 of income	7.65% on first $110,000 paid in wages	13.3% on first $110,000 of net profits
1.45% of income in excess of $110,000	1.45% of wages paid in excess of $110,000	2.9% of net profits in excess of $110,000

If you are self-employed and earn $178,000, what are your FICA taxes?

(A) $7,201 (B) $12,234 (C) $16,602 (D) $23,674 (E) None of these

4. Calculators were purchased at $75 per dozen and sold at $20 for three calculators. What is the profit on six dozen calculators?

(A) $5 (B) $30 (C) $80 (D) $165 (E) None of these

5. A z-score describes how many standard deviations a data item in a normal distribution lies above or below the _____.

(A) Frequency (B) Mean (C) Median (D) Mode (E) None of these

6. Bubba is buying a new truck on which he is going to make monthly payments for six years. If the truck has a total price of $42,250.00 and his interest rate is 2.6%, what are his monthly payments? Round your answer to the nearest cent.

(A) $90.69 (B) $542.86 (C) $602.06 (D) $634.40 (E) None of these

7. Determine whether the following statement is true or false and explain why.

"The choice of voting method can affect an election's outcome."

Choose the correct answer below.

(A) The statement is true because, for any given preference table, each voting method always produces a different winner.

(B) The statement is false because, if a candidate wins with a majority, that candidate will win regardless of the voting method chosen.

(C) The statement is false because, in a fair voting system, every voting method needs to produce the same winner.

(D) The statement is true, because the winner of an election with one voting method, may not win using another.

(E) None of these

8. A sofa regularly sells for $830. The sale price is $655.70. Find the percent decrease of the sale price from the regular price.

(A) 21% (B) 26% (C) 26.6% (D) 79% (E) None of these

9. A class consists of 23 women and 31 men. If a student is randomly selected, what is the probability that the student is a man?

(A) 31 (B) 31/54 (C) 23/54 (D) 23/31 (E) None of these

10. The length of time it takes college students to find a parking spot in the library parking lot follows a normal distribution with a mean of 4 minutes and a standard deviation of 1 minute. Find the probability that a randomly selected college student will find a parking spot in the library parking lot in less than 3.5 minutes.

(A) 30.85% (B) 26.74% (C) 35.51% (D) 69.15% (E) None of these

11. Find the mode for the data items in the given frequency distribution.

Score, x	1	2	3	4	5	6	7	8	9	10
Frequency, f	1	1	3	5	9	7	6	5	5	1

(A) 5 (B) 5.5 (C) 5.95 (D) 9 (E) None of these

12. Find the mean for the following group of data items. Round to the nearest hundredth.

62, 62, 33, 32, 86, 62

(A) 45.83 (B) 55.00 (C) 56.17 (D) 62 (E) None of these

13. Four students are running for president of the Math Club: Bryan (B), Jaime (J), Daniel (D), and Hillary (H). The votes of the current club members are summarized in the following table.

Number of Votes	18	5	11	10	7
1st	H	J	D	B	J
2nd	J	B	H	D	B
3rd	D	H	B	J	D
4th	B	D	J	H	H

Determine the winner using plurality with elimination.

(A) Bryan (B) Jaime (C) Daniel (D) Hillary (E) None of these

14. A tree is

(A) Any connected graph

(B) Any graph without circuits

(C) Any connected graph with no circuits

(D) Any connected graph with circuits

(E) None of these

15. Suppose that the local sales tax rate is 6% and you purchase a car for $11,400.

How much tax is paid?

(A) $6,840 (B) $684 (C) $18,240 (D) $12,084 (E) None of these

The table shows the number of college students (out of 209) who prefer a given pizza topping. Use the table to answer questions 16 & 17.

toppings	freshman	sophomore	junior	senior
cheese	10	10	25	26
meat	23	26	10	10
veggie	10	10	23	26

16. Find the probability that a randomly selected student prefers cheese pizza.

(A) 43/209 (B) 71/209 (C) 10/43 (D) 10/71 (E) None of these

17. Find the probability that a randomly selected student prefers cheese pizza given that the student is a freshman.

(A) 43/209 (B) 43/71 (C) 10/43 (D) 10/71 (E) None of these

Use the following numbers to answer questions 18 – 20.

80, 20, 50, 20, 40

18. What is the median?

(A) 40 (B) 42 (C) 45 (D) 50 (E) None of these

19. What is the range?

(A) 20 (B) 40 (C) 60 (D) 80 (E) None of these

20. What is the standard deviation?

(A) 22.2 (B) 23.7 (C) 24.9 (D) 26.5 (E) None of these

21. Use the 68-95-99.7 Rule for a normal distribution to answer the following. A test has a mean of 81 and a standard deviation of 6. What percent of test takers scored above 87?

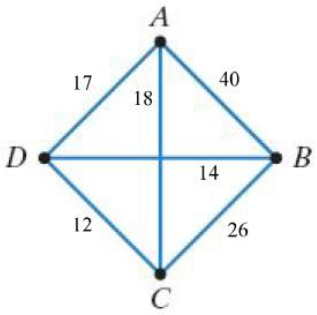
(A) 16 (B) 5 (C) 84 (D) 32 (E) None of these

22. A person can order a new car with a choice of 8 possible colors, with or without air conditioning, with or without automatic transmission, with or without power windows, and with or without a CD player. In how many different ways can a new car be ordered with regard to these options?

(A) 16 (B) 32 (C) 64 (D) 128 (E) None of these

23. Use the complete weighted graph shown to find the weight of the following Hamilton circuit:

A, B, D, C, A



(A) 43
(B) 75
(C) 84
(D) 95
(E) None of these

24. The measure of central tendency that is found by adding the lowest and highest data values and dividing the sum by 2 is called the _____.

(A) Mean (B) Median (C) Range (D) Standard Deviation (E) None of these

25. A connected graph has no Euler paths and no Euler circuits if the graph has _____.

(A) No odd vertices
(B) Less than 2 odd vertices
(C) Exactly 2 odd vertices
(D) More than 2 odd vertices
(E) None of these

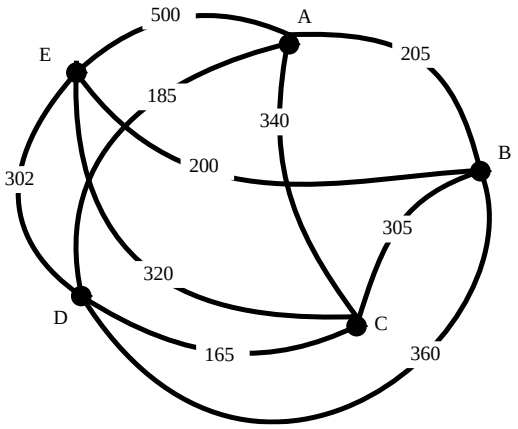
26. The Smiths begin a college savings account for their newborn infant. They deposit $45 in the account at the end of each month, beginning with the child's first month of life. The interest rate is 3.5% compounded monthly. What is the total value of the account after 18 years of investing each month? Round to the nearest cent.

(A) $28,599.44 (B) $10,060.02 (C) $13,513.73 (D) $900.42 (E) None of these

27. A data presentation that separates each data item into two parts is called a _____.

(A) Histogram
(B) Grouped frequency distribution
(C) Frequency distribution
(D) Stem-and-leaf plot
(E) None of these

Use the graph to answer questions 28 & 29.



28. What is the weight of the Hamiltonian circuit found by using the nearest neighbor algorithm starting at vertex D?

(A) 1355
(B) 1170
(C) 1075
(D) 755
(E) None of these

29. Which of the following edges are not included in the minimum spanning tree?

(A) AD (B) CA (C) BE (D) AB (E) None of these

30. A set of data items is normally distributed with a mean of 240 and a standard deviation of 32. Convert 240 to a z-score.

(A) 0.87 (B) – 0.87 (C) 0 (D) 1 (E) None of these

31. A fair coin is tossed two times in succession. The set of equally likely outcomes is $\{HH, HT, HT, TT\}$. Find the probability of getting exactly zero tails.

(A) 0 (B) $1/4$ (C) $1/2$ (D) $3/4$ (E) None of these

32. Write 0.002 as a percent.

(A) 0.0002% (B) 0.2% (C) 2% (D) 0.02% (E) None of these

33. The table shows the distribution, by age, of a random sample of 3650 moviegoers ages 12-74. If one moviegoer is selected from this population, find the probability, expressed as a decimal rounded to 2 places, that the moviegoer's age is at least 25.

(A) 0.23
(B) 0.80
(C) 0.20
(D) 0.57
(E) None of these

Age Distribution of Moviegoers

Ages	Number
12-24	730
25-44	830
45-64	940
65-74	1150

34. A mortgage company requires 15% down on the appraised value of a home before it will approve financing. If a home is appraised for $185,000, how much money will be financed?

(A) $185,000 (B) $170,000 (C) $27,750 (D) $157,200 (E) None of these

35. The principal P is borrowed at a simple interest rate r for a period of time t. Find the simple interest owed for the use of the money.

$P = \$2000, \quad r = 9.0\%, \quad t = 9\ months$

(A) $135 (B) $1620 (C) $2135 (D) $3620 (E) None of these

36. Assume you have a graph with vertex set V = {A, B, C, D, E} and edge set E = {AE, BD, CD, DE, DD}. The degree of vertex D is:

(A) 5 (B) 4 (C) 3 (D) 2 (E) None of these

37. The random variable X is the number of children under 18 in families in a particular town. Use the probability distribution table to find the expected number of children per family (expected value).

X	P(x)
0	.3273
1	.2684
2	.2161
3	.1309
4	.0426
5	.0147

(A) 1.3372 (B) 1.6645 (C) 2.0123 (D) 1 (E) None of these

38. Find the adjusted gross income for a tax payer that earned wages of $44,500; received $2100 in interest from a savings account, and contributed $2900 to a tax-deferred retirement plan. He was entitled to a personal exemption of $3800 and had deductions totaling $5300.

(A) 46,600 (B) 43,700 (C) 39,500 (D) 34,600 (E) None of these

39. Determine the present value P, you must invest to have the future value A, at simple interest rate r, after time t. Round your answer to the nearest dollar.

$A = \$228.60, \quad r = 9\%, \quad t = 3\ years$

(A) $187 (B) $180 (C) $207 (D) $183 (E) None of these

40. The annual interest rate and a line of an amortization schedule (the first month) for a loan are given. Assume that payments of $300 are made monthly and that the annual interest rate is 6%. Find the balance of the loan after the 2nd month.

Payment #	Interest Payment	Principal Payment	Balance of Loan
1	110	190	$21,700
2			?????

(A) $21,508.50 (B) $21,400 (C) $21,510 (D) $21,591.50 (E) None of these

The last page of this exam is the formula sheet and z-score table. You may tear that page out of the exam for your reference.

You must use a pencil to fill in your scantron!

Final Exam Formula Sheet. FEEL FREE TO TEAR OFF THIS LAST DOUBLE SIDED PAGE

Standard Scores and Percentiles

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

TABLE 12.19 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

Example set of 52 poker playing cards

Suit	Ace	2	3	4	5	6	7	8	9	10	Jack	Queen	King
Clubs													
Diamonds													
Hearts													
Spades													

P = the principal amount invested or borrowed (present value)
A= accumulated amount (future value)
r = the interest rate (as a decimal)
t = time (in years)
n = number of compound periods per year
PMT = loan payment

1) Simple Interest:

$Interest = Prt$

2) Future Value (with Simple Interest):

$A = P + Prt$

3) Compound Interest -finite # of compound periods:

(Loan or Investment)

$A = P\left(1 + \frac{r}{n}\right)^{nt}$ $P = \frac{A}{\left(1+\frac{r}{n}\right)^{nt}}$

4) Compound Interest –continous

$A = Pe^{rt}$

e is approximately 2.71828 (but use e-button on calculator)

5) Savings Formula (Annuities)

P = deposit made at the end of each time period

$$A = \frac{P\left[\left(1+\frac{r}{n}\right)^{nt} - 1\right]}{\frac{r}{n}}.$$

6) Savings formula (Annuities)

$$P = \frac{A\left(\frac{r}{n}\right)}{\left[\left(1+\frac{r}{n}\right)^{nt} - 1\right]}.$$

7) Loan Formula (Amortization Formula):

$$PMT = \frac{P\left(\frac{r}{n}\right)}{\left[1-\left(1+\frac{r}{n}\right)^{-nt}\right]}.$$