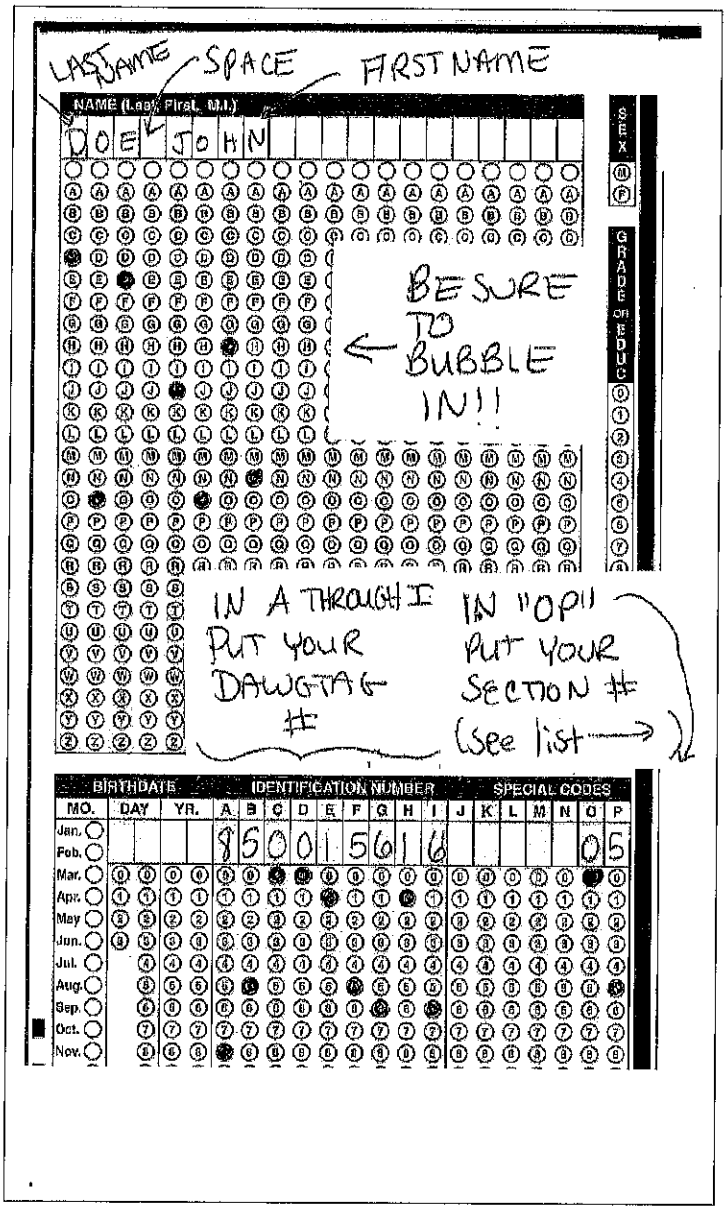
Math 101
Final Exam Spring 2018 **BLUE FORM**

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.*
- *The formula sheet is on the last page. Feel free to tear it out and use it.*
- *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. Return your board before leaving.*

On your scantron, encode your name as specified on the scantron, encode your Dawgtag as your "Identification Number," and encode your ***Section #*** under the area labeled "Special Codes" column "OP".

SAMPLE SCANTRON

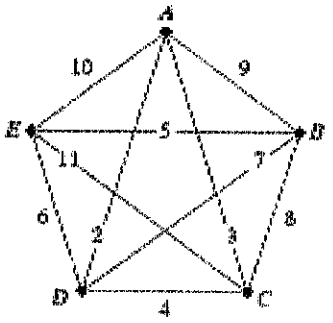


INSTRUCTOR/DAYS IS GIVEN:

Sec	Days	Time	Instructor
1	TR	9-9:50	Rathnayake, Rasanji
2	WF	9-9:50	Athapattu, Chathurika
3	TR	10-10:50	Pfister, Jamie
4	WF	10-10:50	Castelli, Vina
5	WF	12-12:50	Pfister, Jamie
11	TR	2-2:50	Parks, Christy
12	WF	2-2:50	Senarathna, Herath
13	TR	3-3:50	Wijerathne, Menake
20	MWF	11-11:50	Liew, Jie Shi

Use the complete, weighted graph to answer the following 3 questions.

1. What is the weight of edge AB?



   A) None of these
   B) 10
   C) 9
   D) 8
   E) 7

2. Use the nearest-neighbor algorithm to find a Hamilton circuit that begins at vertex E.
   A) EBDACE
   B) EDBACE
   C) EBDCAE
   D) EDBCAE
   E) None of these

3. Use Kruskal's algorithm to find the weight of the minimal spanning tree.
   A) 15 B) 16 C) 18 D) 19 E) None of these

4. The Smiths begin a college savings account for their newborn infant. They deposit $70 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) $21,021.35 B) None of these C) $44,678.49 D) $15,649.20 E) $118,090.13

5. Which measure of central tendency is the value that occurs most often in a data set?
   A) Mode B) Median C) Midrange D) Mean E) None of these

6. Find the standard deviation for the group of data items. Round to the nearest hundredth.

$$14, 15, 16, 17, 18$$

   A) 1.58
   B) 2.50
   C) None of these
   D) 0.00
   E) 1.25

Use the data set to answer the next 2 questions.

$$12, 7, 4, 0, 2, 1, 2, 0, 0$$

7. Find the median for the group of data items.
   A) 2 B) 5 C) 4 D) 0 E) None of these

8. Find the range for the group of data items.
   A) 2 B) 4 C) 10 D) 12 E) None of these

9. A professor had students keep track of their social interactions for a week. The number of social interactions over the week is shown in the grouped frequency distribution. How many students had at least 70 social interactions for the week?
   A) None of these
   B) 7
   C) 8
   D) 9
   E) 15

Number of Social Interactions	Frequency
40-44	13
45-49	11
50-54	13
55-59	14
60-64	15
65-69	9
70-74	7
75-79	4
80-84	1
85-89	3

[redacted]
most first place votes is declared the winner is called the
method.
A) Borda count
B) [redacted]
C) Plurality
D) Plurality with elimination
E) Preference

11. License plates in a particular state display 4 letters followed by 2 numbers. How many different license plates can be manufactured for this state?

    A) 2080 B) 457,076 C) 6,760,000 D) 45,697,600 E) None of these

Use the frequency distribution to answer the next 2 questions.

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

12. Find the mode for the data items in the frequency distribution.

A) 5 B) 6 C) 8 D) 10 E) None of these

13. Find the mean for the data items in the frequency distribution. Round to the nearest tenth.

A) 5 B) 5.5 C) 5.6 D) 6 E) None of these

14. Assume you have a graph with vertex set V = {A, B, C, D} and edge set E = {AB, AC, CC, DA, DD, DB}. What is the degree of vertex D?

A) 4 B) None of these C) 2 D) 1 E) 3

15. Numbered disks are placed in a box and one disk is selected at random. If there are 6 red disks numbered 1 through 6, and 7 yellow disks numbered 7 through 13, find the probability of selecting a disk numbered 3, given that a red disk is selected.

A) 6/13 B) 1/6 C) 7/13 D) 1/13 E) None of these

16. Express the fraction $\frac{2}{5}$ as a percent. Round to one decimal place.

A) 4.0% B) 80.0% C) 50.0% D) 40.0% E) None of these

17. You randomly select one card from a 52-card deck. Find the probability of selecting the six of diamonds or the three of spades.

A) 1/52 B) 1/26 C) 1/13 D) 1/4 E) None of these

18. What is the simple interest owed for borrowing $4000 for 15 months at a simple interest rate of 2.0%?

A) $1,200 B) $12,000 C) $100 D) $1,000 E) None of these

19. A set of data items is normally distributed with a mean of 20 and a standard deviation of 9. Find the z-score for a data value of 19. (Round to 2 decimal places.)

A) 0.11 B) −0.11 C) −0.05 D) 0.05 E) None of these

20. Dinner club members were given a questionnaire about their favorite course. The choices are Appetizer (A), Entree (E), and Dessert (D), and their votes are summarized in the following preference table. Which course is selected as the most favorite using the plurality with elimination method?

Number of Votes	21	13	7	5
First choice	E	D	A	D
Second choice	A	A	D	E
Third choice	D	E	E	A

A) Entree B) [illegible] C) [illegible] D) [illegible] E) [illegible]

21. A data presentation with data values listed in one column and the adjacent column indicates the number of times each value occurs is called a _____.
    A) Histogram
    B) Probability distribution
    C) Stem-and-leaf plot
    D) Frequency distribution
    E) None of these

22. Find the taxable income for a taxpayer who earned wages of $66,100, received $850 in interest from a savings account, and contributed $2,400 to a tax-deferred retirement plan. He was entitled to a personal exemption of $3,800, and had deductions totaling $5,970.

    A) $66,950 B) $64,550 C) $59,580 D) $54,780 E) None of these

23. Suppose $2500 is invested in a savings account at 7% interest compounded quarterly. How much money will be in the account after 5 years? (Round to the nearest cent.)
    A) $3536.95 B) $2726.54 C) $5599.24 D) $9674.21 E) None of these

24. Suppose that prices of a certain model of new homes are normally distributed with a mean of $150,000 and standard deviation of $1,900. Use the 68-95-99.7 rule to find the percentage of buyers who paid between $148,100 and $151,900.

    A) 95% B) 99.7% C) 68% D) 34% E) None of these

25. A dress regularly sells for $138. The sale price is $120. Find the percent decrease of the sale price from the regular price. Round to the nearest tenth of a percent.
    (A) 87.0% (B) 15.0% (C) 66.7% (D) 13.0% (E) None of these

26. 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 5.5 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 5 minutes.

(A) 19.15% (B) 35.51% (C) 26.74% (D) 30.85% (E) None of these

27. Determine whether the statement is true or false. If the statement is false, make the necessary change(s) to produce a true statement.

"The mean, median, and mode of a normal distribution are all equal."

A) The statement is true.
B) The statement is false. The mean and median of a normal distribution are equal.
C) The statement is false. The mean and mode of a normal distribution are equal.
D) The statement is false. The mean, median, and mode of a normal distribution are all different.

28. Determine whether the statement is true or false, and choose the correct answer below.
"A tree is a complete graph."

A) The statement is true. A tree has exactly one path joining any two vertices.
B) The statement is false. A tree does not have exactly one path joining any two vertices.
C) The statement is false. A tree does not have an edge between each pair of its vertices.
D) The statement is true. A tree has an edge between each pair of its vertices.

29. You are dealt one card from a standard 52-card deck. Find the probability that you are not dealt a diamond.

A) 1/4 B) 4/13 C) 2/5 D) 3/4 E) None of these

30. An automobile purchased for $34,000 is worth $1800 after 7 years. Assuming that the car's value depreciated steadily from year to year, what was it worth at the end of the third year?

(A) $4600 (B) $20,200 (C) $10,800 (D) $29,400 (E) None of these

31. The amount financed on a certain home, after the down payment is made, is $189,000. The mortgage is financed with a 15-year fixed-rate mortgage at 8.5%. Determine the monthly mortgage payment (excluding escrowed taxes and insurance) to the nearest dollar.

(A) $2,361 (B) $1,741 (C) $1,861 (D) $2,011 (E) None of these

32. The table shows claims and their probabilities for an insurance company.

Calculate the expected value.

A) 10,600
B) 1,767
C) 50,000
D) 1,060
E) None of these

Amount of claim (to the nearest $20,000)	Probability
$0	0.70
$20,000	0.17
$40,000	0.06
$60,000	0.05
$80,000	0.01
$100,000	0.01

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

TABLE 8.2 2012 FICA Tax Rates

Employee's Rates	Matching Rates Paid by the Employer	Self-Employed Rates
• 5.65% on first $110,000 of income • 1.45% of income in excess of $110,000	• 765% on first $110,000 paid in wages • 1.45% of wages paid in excess of $110,000	• 13.3% on first $110,000 of net profits • 2.9% of net profits in excess of $110,000

If you are not self-employed and earn $117,000, what are your FICA taxes?

(A) $7911.50 (B) $6316.50 (C) $14,833 (D) $6610.50 (E) None of these

34. A fair coin is tossed three times in succession. The set of equally likely outcomes is: $\{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$. Find the probability of getting exactly two heads.

(A) 0 (B) 1/8 (C) 3/8 (D) 1/2 (E) None of these

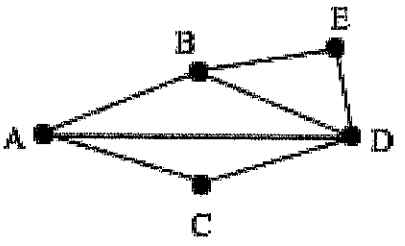
35. A mortgage company requires 15% down on the appraised value of a home before it will approve financing. If a home is appraised for $175,000, how much money will be financed?

(A) $148,750 (B) $160,000 (C) None of these (D) $26,250 (E) $175,000

36. In a laboratory course in veterinary biology, fleas gathered from Alexander, a volunteer pet dog, averaged 0.165727 inches in length. Round this amount to the nearest thousandth.

(A) 0.165 inches (B) 0.167 inches (C) 1 inch (D) 0.166 inches (E) None of these

37. Use the graph to answer the question. By Euler's theorem, the graph has at least one Euler path because:



A) It has exactly two odd vertices.
B) It has exactly two even vertices.
C) None of these
D) It has more than two odd vertices.
E) All graph have at least one Euler path.

38. You borrow $1000 from a friend and promise to pay back $1615 in 3 years. What simple interest rate, to the nearest tenth of a percent will you pay?

(A) 20.5% (B) 38.1% (C) 61.5% (D) 12.7% (E) None of these

39. Use the table to find the probability that a randomly selected single parent in the U.S. military is female. Round to two decimal places.

	Army	Navy	Marine Corps	Air Force	Total
Male	23	24	7	14	68
Female	9	7	1	6	23
Total	32	31	8	20	91

(A) 0.75 (B) 0.35 (C) 0.39 (D) 0.25 (E) None of these

40. Suppose that a certain car has the following average operating and ownership costs.

Average Costs per Mile		
Operating	Ownership	Total
$0.28	$0.68	$0.96

If you drive 30,000 miles per year, what is the total annual expense for this car?

(A) $31,250 (B) $22,000 (C) $20,400 (D) $8,400 (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

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													

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

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):

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