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/LAB DAY IS GIVEN:

Instructor Lowndes
8:00 on Tues. is sec. 1;
8:00 on Thurs. is sec. 2;
9:00 on Tues. is sec. 3;
9:00 on Thurs. is sec. 4;
10:00 on Tues. is sec. 5
10:00 on Thurs. is sec. 6;

11:00 on Tues. and Thurs. is Sec. 22

Instructor Parks
11:00 on Thurs. is Sec 12;
12:00 on Tues. is Sec. 13;
12:00 on Thurs. is Sec. 14;
1:00 on Tues. is Sec. 15
1:00 on Thurs. is Sec. 16;

Instructor Durig:

2:00 on Tues./Thurs is Sec. 23

Instructor De Alwis

3:00 on Tues./Thurs. is Sec. 24

Instrucor Senarathna

4:00 on Tues./Thurs. is Sec. 25

**Instructor Rupassara**
5:00 on Mon./Wed. is Sec. 27

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 <u>pencil</u> to fill in your scantron!

1. A tree is

    (a) Any graph that is connected and has no circuits.
    (b) Any graph that has no circuits.
    (c) Any graph that has no bridges.
    (d) Any graph that is connected.
    (e) None of these.

2. A graph has a Euler Circuit if

    (a) It is connected and has an even number of edges.
    (b) It is connected and has an odd number of vertices.
    (c) It is connected and every vertex has an even degree.
    (d) It is connected and has exactly two odd vertices.
    (e) None of these.

3. The number of Hamiltonian circuits in a complete graph with 10 vertices is

    (a) 10!   (b) 9!   (c) 10   (d) 9   (e) None of these

4. What is the weight of the Hamiltonian circuit found by using the Nearest Neighbor Algorithm starting at Vertex D?

    (a) $745
   (b) $696
    (c) $667
    (d) $573
    (e) None of these
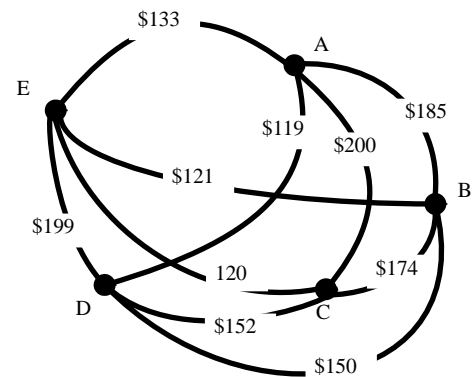
5. Suppose you have a graph with vertex set V={A, B, C, D, E, F} and edge set E={AB, BC, AD, CD, ED, EF, FD, AF}. The degree of vertex F is

    (a) 3   (b) 4   (c) 5   (d) 6   (e) None of these

6. What routing is produced by using the Cheapest-Link Algorithm (Best Edge Algorithm)?
   Write your final answer starting with vertex A.
   (a) ACEBDA   (b) ABEDCA   (c) AECDBA   (d) ADCBEA   (e) None of these

$133

$185

$119

$200

$121

$199

120

$174

$152

$150

E   A   B   D   C
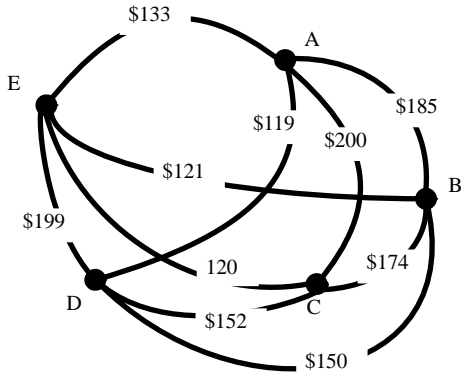
7. Using Kruskal's Algorithm, find the weight of the
   minimum spanning tree on the graph to the right.

   (a) 45
   (b) 46
   (c) 47
   (d) 48
   (e) None of these

E
13
11
D
14
21
A
22
17
12   9
16
15
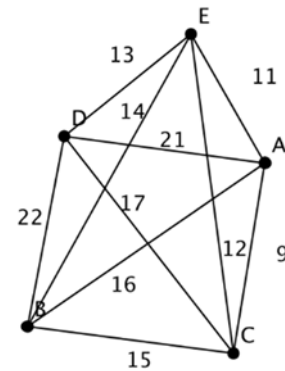
8. What is the value of the 1st quartile Q1 from the 5 number summary for the following data
   set:

| 37 | 26 | 13 | 8 | 12 | 29 | 6 | 17 | 42 | 26 |

   (a) 12
   (b) 13
   (c) 29
   (d) 21.5
   (e) none of these

9. Jerome owns 15 acres of land which he rents to a farmer for $3600 per acre per year.
   His property taxes are $900 per year. How much profit does Jerome make on the land
   each year?

   (a) $54,000   (b) $53,100   (c) $2700   (d) $54,900   (e) None of these

10. The annual interest rate and a line of an amortization schedule (the first month) for a loan are given. Assume that payments of $400 are made monthly and that the annual interest rate is 6.5%. Find the amount paid towards principal the 2nd month.

Payment #	Interest Payment	Principal Payment	Balance of Loan
1	$178.75	$221.25	$32,500
2		??	

A) $223.96   B) $176.04   C) $193.45   D) $201.33   E) $196.87

Use the following information to answer the next four questions.
A box contains 4 green, 3 blue, 5 yellow, and 2 red marbles.

11. What is the probability of drawing a blue marble and then another blue marble without replacing the first marble before the 2nd is drawn?

(a) 3/91   (b) 4/49   (c) 4/91   (d) 3/49   (e) None of these

12. What is the probability of drawing a blue and then a yellow marble *with* replacement?

(a) 1/49   (b) 15/182   (c) 15/91   (d) 15/196   (e) None of these

13. What are the odds in favor of drawing a blue marble?

(a) 3/14   (b) 11/14   (c) 3:11   (d) 11:3   (e) None of these

14. What is the probability that a marble drawn is **not** blue?

(a) 3/14   (b) 11/14   (c) 3:11   (d) 11:3   (e) None of these

15. 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. Who wins using plurality with elimination?

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

(a) Bryan   (b) Jaime   (c) Daniel   (d) Hillary   (e) It is a tie

For the next 2 questions, use the following information.
The price of a home is $244,000. The bank requires a 20% down payment and three points at the time of closing. The cost of the home is financed with a 30-year fixed-rate mortgage at 9%.

16. Find the required down payment.

    (a) $4,880   (b) $4,800   (c) $24,400   (d) $48,800   (d) None of these

17. Find the amount of the mortgage.

    (a) $244,000   (b) $292,800   (c) $195,200   (d) $248,800   (e) None of these

18. What is the GPA (on a 4 point scale) for a student who earned:
    A in Math (3 credit hours)
    B in Science (3 credit hours)
    B in History (2 credit hours)
    B in English (4 credit hours)

    (a) 3.30
    (b) 3.00
    (c) 3.31
    (d) 3.25
    (e) None of these

19. You decide to work part-time at a local supermarket. The job pays $9 per hour and you work 25 hours per week. Your employer withholds 10% of your gross pay for federal taxes, 5.65% for FICA taxes, and 2% for state taxes.   What is your weekly net pay?

    (a) $225   (b) $186.19   (c) $207.79   (d) $185.29   (e) None of these

20. In the following table, the random variable x represents the number of people who have a college degree in a randomly selected group of four adults from a particular town. The probability distribution is given in the table. Find the expected value of the random variable x. Round to the nearest tenth.

x	$P(x)$
0	0.3456
1	0.1296
2	0.3456
3	0.0256
4	0.1536

    (a) 1.5   (b) 1.6   (c) 1.7   (d) 1.1   (e) None of these

21. Find the taxable income for a tax payer that earned wages of $52,000, received $540 in interest from a savings account, and contributed $3000 to a tax-deferred retirement plan. He was entitled to a personal exemption of $3500 and had deductions totaling $8100.

    (a) $52,540
    (b) $48,460
    (c) $36,860
    (d) $37,940
    (e) None of these

22. How much would you have at the end of 5 years if you invest $4000 in a simple interest account at 2.5%?

    (a) $4526   (b) $4500   (c) $4532   (d) $500   (e) None of these

23. Gregor Mendel found that flower color in certain pea plants obeyed this particular scheme:
    Pure red flowers crossed with pure white flowers produce red flowers. When pure red (RR) and pure white (rr) are crossed, the resulting Rr combination (one dominant, one recessive gene) produces second-generation offspring with red flowers since red is the dominant gene. Suppose that two of these second-generation Rr flowers are crossed. What is the probability that the resulting plant will have white flowers?

    (a) 0.75   (b) 0.25   (c) 0.50   (d) 0.85   (e) None of these

For the next three questions, use the following set of data.
                                {37, 26, 13, 8, 12, 29, 6, 17, 42, 26}

24. Calculate the mean.

    (a) 22.3   (b) 21.6   (c) 20.1   (d) 23.3   (e) None of these

25. What is the mode?

    (a) 29   (b) 26   (c) 21.5   (d) 21   (e) None of these

26. What is the range?

    (a) 48   (b) 21.5   (c) 24   (d) 36   (e) None of these

27. License plates in a particular state display 3 letters followed by 2 numbers. How many different license plates can be manufactured (repetitions of numbers and letters are allowed).

    (a) 98   (b) 1404000   (c) 1757600   (d) 1423656   (e) None of these

28. A data set has a mean of 42 with a standard deviation of 7. According to the 68-95-99.7% rule, between what two values do 95% of data values fall?

    (a) 28, 56   (b) 29, 57   (c) 35, 49   (d) 21, 63   (e) None of these

29. Express 0.89 as a percent.

    (a) 89%   (b) 8.9%   (c) 0.89%   (d) 890%   (e) None of these

30. A shirt regularly sells for $54. The sale price is $ 28. Find the percent decrease of the sale price from the regular price. Round to the nearest tenth of a percent.

    (a) 39.2%   (b) 26.0%   (c) 92.9%   (d) 48.1%   (e) None of these

31. Diners at the Rive Gauche restaurant answer a questionnaire about their favorite course in a French meal. The choices are: Appetizer (A), Entree (E), and Dessert (D). Their votes are summarized in the following table. If 3rd place = 1 pt, 2nd place, =2 points, etc. How many points does the Dessert (D) receive using the Borda Count Method?

Number of votes	18	12	8	6
First choice	A	E	D	E
2nd choice	E	D	E	A
3rd choice	D	A	A	D

    (a) 104   (b) 7   (c) 46   (d) 72   (e) None of these

32. How much will be in an account after 6 years if $450 is invested at 6% interest, compounded quarterly? Round to the nearest cent.

    (a) $12885.08   (b) $612.00   (c) $643.28   (d) $622.90   (e) None of these

33. Assume the population in the US is normally distributed with a mean IQ of 100 and a standard deviation of 15. According to the z-score table, approximately what percent of the US populations has an IQ below 104.5?

    (a) 61.79%
    (b) 38.21%
    (c) 4.5%
    (d) 79.61%
    (e) None of these

34. The following table contains data from a study of two airlines which fly to Small Town, USA.

	Number of flights which were on time	Number of flights which were late
Podunk Airlines	33	6
Upstate Airlines	43	5

If one of the 87 flights is randomly selected, find the probability that the flight selected is on time given that it was an Upstate Airlines flight.

    A) 43/48   B) 43   C) 43/76   D) 43/87   E) None of these.

35. Suppose a mortgage of $195,200 is financed for 30 years at 9%.
    Find the monthly payment. Round to the nearest whole dollar.

    (a) $5,856   (b) $1,571   (c) $2,226   (d) $1,952   (e) None of these

36. If Bob pays $150.97 per month for his car payment on an $8000 car which was financed for 5 years. How much interest will he pay?

    (a) $2014.35   (b) $1058.20   (c) $6188.36   (d) $9058.20   (e) None of these

37. During a recent election, every candidate was matched on a one-on-one basis with every other candidate. The winner is

    (a) the pairwise comparison winner.
    (b) the plurality winner.
    (c) the Borda Count winner.
    (d) the majority winner.
    (e) None of these

38. What percent of 30 is 3?

    (a) 0.01%   (b) 10%   (c) 0.1%   (d) 1.0%   (e) None of these

39. Interest that is calculated only on the original principal is

    (a) compound interest.
    (b) mortgage interest.
    (c) complex interest.
    (d) minimal interest.
    (e) None of these

40. Find the standard deviation. Round only the final answer to 2 decimal places.
    20, 30, 40, 45

    a) 33.75
    b) 11.09
    c) 9.60
    d) 10.12
    e) None of these

Final Exam Formula Sheet. <u>FEEL FREE TO TEAR OFF THIS LAST DOUBLE SIDED PAGE</u>

| 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:

$Interest = Prt$

6) Savings formula (Annuities)

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

2) Future Value (with Simple Interest):

$A = P + Prt$

3) Compound Interest -finite # of compound periods:

(Loan or Investment)

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

7) Loan Formula (Amortization Formula):

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

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

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

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