Test Points 120. Show your work on extra paper as needed. Circle Answers.
GOOD LUCK! Alles gute! Bonne chance! Held og lykke! Buena suerte! Kali tihi!

1. (6) Of 60 applicants for a job, 20 had at least four years of experience, 35 had degrees, and 20 had less than 4 years of experience and did not have a degree. Complete the following table: The yellow are given you fill in the rest.

	< 4 years	**≥ 4 years**	**Totals**
Degree	20	15	35
No Degree	20	5	25
Totals	40	20	60

Based upon the above table, answer the following questions.

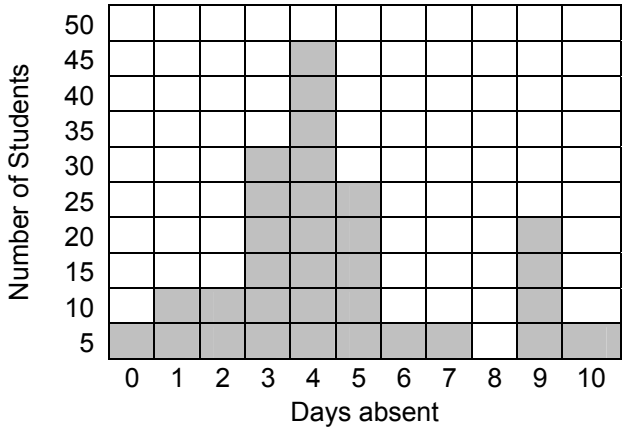
2. (5) What is the joint probability distribution associated with years of experience and degree?

20/60 = 1/3	15/60 = 1/4
20/60 = 1/3	5/60 = 1/12

3. (2) What is the probability that a job applicant has more than four years of experience without a degree? _____5/60 = 1/12_____

4. (2) Given that the job applicant has less than four years of experience, what is the probability that they don't have a degree? __20/40 = 1/2____

In a group of students, the following frequency distribution summarizes the number of students that were absent a certain number of days during the semester.



5. (2) What is the probability that a student missed four days or less? _100/160 = 20/32 = 5/8 = .625

6. (2) What is the probability that a student missed more than 8 days of school? _25/160 = 5/32 = .156___

7. (5) What is the probability distribution associated with the number of days absent?

x	0	1	2	3	4	5	6	7	8	9	10
P(x)	1/32	2/32	2/32	6/32	9/32	5/32	1/32	1/32	0/32	4/32	1/32

8. (6) What are the mean, median, and mode of the days absent?

Mean	Median	Mode
144/32 = 4.5 = 720/160	4	4

9. (5) What is the value of $\sum_{i=1}^{25}(4i-4) = \sum_{i=1}^{25}4i - \sum_{i=1}^{25}4 = 1300 - 100 = 1200$

10. (2) The average of 4, 8, and 12 is equal to the average of 7, 9, and x, what is the value of x? ____8_____

11. (2) How many combinations of the letters {a, b, c, d, e} can you make that include the letters {c, d}? This is tricky: Number of subsets of {a,b,e} and just add {c,d} = 8

$$ {}_3C_0 + {}_3C_1 + {}_3C_2 + {}_3C_3 = 1 + 3 + 3 + 1 = 8 $$

{c,d}, {a,c,d}, {b,c,d}, {e,c,d}, {a,b,c,d}, {a,e,c,d}, {d,e,c,d}, {a,b,e,c,d}

12. (2) If n! equals 40,320 and (n-1)! equals 5,040, what is the value of n?

n! = n×(n-1)!, n = n!/(n-1)! → 40320/5040 = 8

13. (2) A math professor has a file of 100 math questions. How many ways can she create quizzes consisting of 3 unique questions? $ {}_{100}C_3 = \frac{100!}{3!(100-3)!} = 161{,}700 $

14. (2) What is the value of $\frac{{}_nP_k}{{}_nC_k}$ in terms of n and k? _____k!_____

15. (2) How many arrangements can be made with the letters MISSISSIPPI?

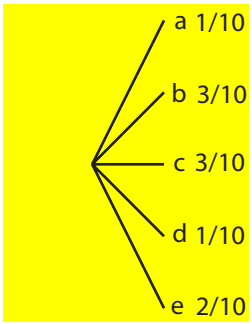
11!/(4!×4!×2!) = 34,650

16. (2) If 26 data points collected over two days have an expected value of 13, what is their average value? _____13____ Don't let all the verbiage psych you out!

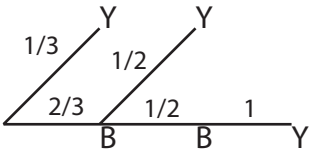
17. (2) When a distribution is skewed to the right, the expected value is ***greater than*** or ***less than*** the median? ___greater than____

18. (14) If a sample space consists of independent events {a, b, c, d, e}, events R and S are defined such that R = {a, d, e} and S = {a, b, e}. If p(R∩S) = 3/10, complete the following table. Since R∩S = {a, e} = 3/10, then p(e) = 3/10 – 1/10 = 2/10

p(a)	1/10	p(R)	4/10
p(b)	3/10	p(S)	6/10
p(c)	3/10	p(R∪S)	7/10
p(d)	1/10	p(R|S)	3/6
p(e)	2/10	p(S|R)	3/4



19. (5) A bag contains 3 colored balls, two blue and one yellow. Assume that you will be selecting balls without replacement. Let i equal the number of draws necessary to select a yellow ball and p_i equal the probability of selecting the yellow ball on draw i. Draw a tree diagram for p_i.



20. (5) What is the probability distribution of i?

i	P(i)
1	1/3
2	1/3
3	1/3

21. (3) What is the expected value of i? ___2___

22. (2) If the probability of an event is 3/5, what are the odds in favor of the event? 3:2__

23. (5) The add-on interest for a loan is \$172 per year, and the total monthly payments over four years are \$14,400, what is the add-on interest rate? r = 172/3472 = 5%

    Annual payment = How much money did they borrow? \$13,712

    14400/4 = 3600. Annual principal payment (excl interest) = 3600 – 172 = \$3428
    Amount borrowed = 3428 × 12 = \$13,712

24. (10) A family has a plan to save \$122.05 per month for 10 years at 6% interest. They are told that if they receive a gift on an amount x at the end of year 4 which they can add to their savings account, the amount they need to save monthly will be reduced to \$91.54. The gift plus a monthly savings plan of \$91.54 will result in the same amount of money after 10 years as they would have got by saving \$122.05. If the gift will earn interest at the rate of 6% compounded annually, compute the following:
    FV(122.05, .5%, 120) = \$20,000 Future value of savings: \$20,000

    FV(91.54, .5%, 120) = \$15,000 Gift amount: \$3,525

    FV of gift = \$20,000 - \$15,000 = \$5,000
    Present value of gift when given in year 4 = $5000/(1.06)^6 = \$3,525$

25. (5) Your monthly mortgage payment of \$1800 is 36% of your take home pay after taxes. If your gross income before taxes is \$80,000, what is the income tax rate?
    (.36) × (percent take home) × (80,000) = 1800 × 12 = 21,600
    Percent take home = 75%, so tax rate = 25%

26. (5) A house today has an assessed value of \$380,000. The current tax rate is \$1.13 per \$100 dollars. If the tax rate decreases at a compound rate of 1%, but the assessed value of the house increases at a compound rate of 4%, how much more will the monthly taxes be on the house in ten years? Monthly taxes now: \$357.83
    $380{,}000\ (1.04)^{10}$ = Assessed value in ten years: \$562,493
    Ratio of FV to PV of house: 1.48
    New tax rate: $(1.13)(.99)^{10} = 1.022$ Monthly taxes in ten years: \$478.98
    (3800)(1.022)(1.48)/12 = \$478.98 Increase in monthly taxes: \$121.15

27. (5) You are considering borrowing \$20,000 for ten years at 6%. What would your monthly loan payment be? \$222.06 How much would you have to save per month to get \$20,000 in 10 years? \$122.05 - Notice that this is the same information as in problem 24. All you had to do is copy the amount given \$122.05. The loan payment can be calculated by the simple formula $122.05\ (1.005)^{120} = \$222.06$

    Equation 1 is given by 5y + 7x -35 = 0, and
    Equation 2 passes through the points: (0,3) and (-21/5, 0)

28. (4) What are the slopes of the two lines? m_1 -7/5 m_2 5/7

29. (4) What is the product of the slopes? $m_1 \times m_2$ -1

30. (2) What is the relationship between the lines? Perpendicular