Signature: _____

- Check that you have 28 questions in your test pack.
- CODE:
- Fill in the information on the bubble sheet, including the CODE.
- **Sign** the test and sign the bubble sheet.
- Work the problem in the space to the right of the question.
- **Mark** the answer on the test, **then** fill in the bubble sheet. The bubble sheet will be graded.

---

1 pt You roll two dice 4 times. What is the probability of getting doubles at least once?

1.**A**◯ 0.45 **B**◯ 0.52 **C**◯ 0.59 **D**◯ 0.66
E◯ 0.73 **F**◯ 0.80 **G**◯ 0.87 **H**◯ 0.95

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1 pt How many distinct arrangements of these letters are there? A L G E B R A

2.**A**◯ 2016 **B**◯ 2520 **C**◯ 3055 **D**◯ 3634
E◯ 4449 **F**◯ 5656 **G**◯ 7057 **H**◯ 8174

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1 pt For the data set 10, 16, 8, 13, 18, 6 , the population variance is

3.**A**◯ 15.99 **B**◯ 18.14 **C**◯ 19.39 **D**◯ 21.59
E◯ 23.59 **F**◯ 25.00 **G**◯ 26.59 **H**◯ 29.20

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1 pt The weather in East Lansing can be classified as Nice, Not Bad, or Nasty. The probability that tomorrow's weather is the same as today's weather is 0.5. Also,

p(Not Bad | Nice) = 0.24
p(Nasty | Not Bad) = 0.25
p(Nice | Nasty) = 0.1

If today's weather was Not Bad, what is the probability that it will be Not Bad the day after tomorrow?

4.**A**◯ 0.207 **B**◯ 0.295 **C**◯ 0.356 **D**◯ 0.410
E◯ 0.494 **F**◯ 0.536 **G**◯ 0.580 **H**◯ 0.655

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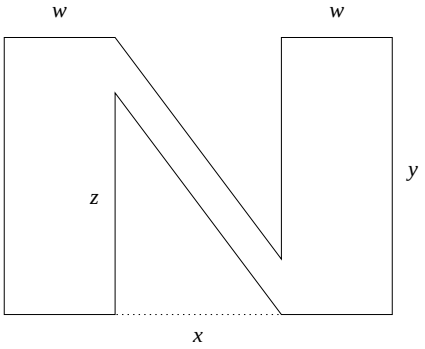
1 pt Find the area of the N-shaped figure shown below if

$w = 2$
$x = 3$
$y = 6$
$z = 4$

Assume angles which appear to be right angles are right angles. The figure may not be precisely to scale.



5.**A**◯ 27 **B**◯ 28 **C**◯ 29 **D**◯ 30
E◯ 31 **F**◯ 32 **G**◯ 33 **H**◯ 34

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1 pt At 6.5 % annual interest compounded monthly, how many years does it take to double your money?

6.**A**◯ 11 **B**◯ 15 **C**◯ 20 **D**◯ 27
E◯ 38 **F**◯ 52 **G**◯ 70 **H**◯ 97

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1 pt It is known that the probability of a battery's being defective is 0.12. You buy 2 batteries. What is the probability that at most one of them is good?

7.**A**◯ 0.03 **B**◯ 0.06 **C**◯ 0.10 **D**◯ 0.13
E◯ 0.16 **F**◯ 0.19 **G**◯ 0.23 **H**◯ 0.26

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1 pt A workgroup consists of 11 engineers and 5 accountants. A committee of 3 people, which will prepare an interim report, is to be formed. In how many ways can the committee be formed if there must be at least one engineer and at least one accountant?

8.**A**◯ 72 **B**◯ 96 **C**◯ 129 **D**◯ 166
E◯ 224 **F**◯ 287 **G**◯ 385 **H**◯ 505

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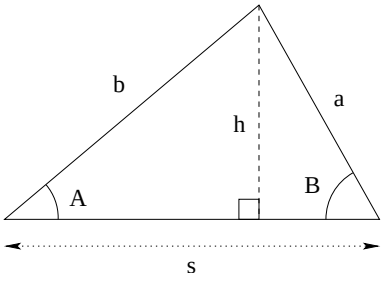
1 pt Two observers are standing 575 ft apart when they watch a hot air balloon pass between them. They each measure the angle of elevation to the balloon; the angles are 37^o and 45^o. What is the elevation of the balloon?



9.**A**◯ 247 **B**◯ 277 **C**◯ 318 **D**◯ 356
E◯ 403 **F**◯ 460 **G**◯ 512 **H**◯ 575

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1 pt The lifespan of a washing machine has a normal distribution with a mean of 101 months and a standard deviation of 10 months. What percentage will break down before 7 years?

10.**A**◯ 4.5 **B**◯ 7.9 **C**◯ 11.2 **D**◯ 13.7
E◯ 17.3 **F**◯ 20.5 **G**◯ 23.3 **H**◯ 26.3

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1 pt What is the effective annual rate of interest, as a percent, given by a bank paying 9.5% annual interest compounded monthly?

11.**A**◯ 8.7 **B**◯ 9.9 **C**◯ 11.2 **D**◯ 12.5
E◯ 14.4 **F**◯ 16.4 **G**◯ 18.1 **H**◯ 20.5

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1 pt In bridge, each player is dealt a hand of 13 cards from a standard deck. What is the probability of getting a bridge hand with no Queens?

12.**A**◯ 0.30 **B**◯ 0.42 **C**◯ 0.48 **D**◯ 0.56
E◯ 0.65 **F**◯ 0.77 **G**◯ 0.83 **H**◯ 0.90

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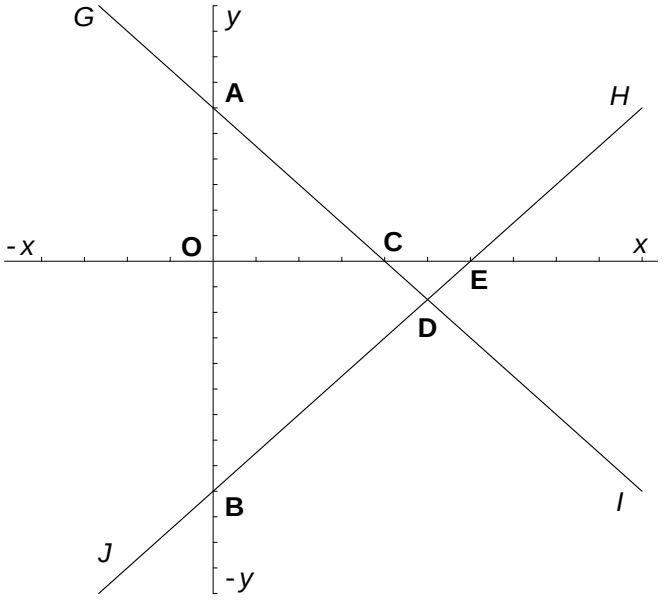
1 pt

Shown below are the graphs of 3x + 2y ≥ 12 and 3x - 2y ≤ 18. Intersections on the graph are indicated by letters **A**, **B**, **C**, etc.. Letters in italics *G*, *y*, *I*, etc. indicate lines extending forever. *(-x)* means in the direction of the negative *x*-axis, etc.



Find the corners of the solution set for the following system of inequalities:
3x + 2y ≥ 12
3x - 2y ≤ 18
x ≥ 0

13. **A**◯ *y***AD***H*
B◯ *y***A***G*
C◯ *H***D***I*
D◯ **ADB**
E◯ *y***ACE***H*
F◯ *G***CE***H**

1 pt

For points inside the region **OCDB**, which one of the following inequalities is true?

14. **A**◯ y ≥ 0
B◯ 3x - 2y ≥ 18
C◯ x ≥ 0
D◯ 3x + 2y ≥ 12
E◯ None of the above

---

1 pt The distribution of scores on an IQ test looks like a bell curve. The mean is 102 and the standard deviation is 18. About what fraction of people taking the test get a score less than or equal to 110?

15.**A**◯ 0.5469 **B**◯ 0.5636 **C**◯ 0.5742
D◯ 0.6013 **E**◯ 0.6193 **F**◯ 0.6340
G◯ 0.6515 **H**◯ 0.6716

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For a group of 29 programmers, the mean salary is $66,000 and the median salary is $60,000.

Calculate the new values of the mean μ and median $\bar{x}$ in each of the following cases.

1 pt The highest paid programmer gets a $20,000.00 raise.

16. **A**◯$\mu = \$86,000.00; \bar{x} = \$80,000.00$
B◯$\mu = \$66,690.00; \bar{x} = \$60,000.00$
C◯$\mu = \$86,000.00; \bar{x} = \$60,000.00$
D◯$\mu = \$66,000.00; \bar{x} = \$60,000.00$
E◯$\mu = \$66,690.00; \bar{x} = \$60,690.00$
F◯$\mu = \$66,690.00; \bar{x} = \$80,000.00$

1 pt The lowest paid programmer, whose salary is less than $40,000.00, gets a $20,000.00 raise.

17. **A**◯$\mu = \$66,690.00; \bar{x} = \$60,690.00$
B◯$\mu = \$86,000.00; \bar{x} = \$80,000.00$
C◯$\mu = \$66,000.00; \bar{x} = \$80,000.00$
D◯$\mu = \$66,000.00; \bar{x} = \$60,000.00$
E◯$\mu = \$66,690.00; \bar{x} = \$60,000.00$
F◯$\mu = \$86,000.00; \bar{x} = \$60,690.00$

1 pt All programmers get a $20,000.00 raise.

18. **A**◯$\mu = \$66,690.00; \bar{x} = \$60,690.00$
B◯$\mu = \$86,000.00; \bar{x} = \$80,000.00$
C◯$\mu = \$66,690.00; \bar{x} = \$80,000.00$
D◯$\mu = \$66,000.00; \bar{x} = \$60,000.00$
E◯$\mu = \$66,690.00; \bar{x} = \$60,000.00$
F◯$\mu = \$86,000.00; \bar{x} = \$60,000.00$

1 pt The two highest paid programmers, both with salaries above $90,000.00, each get a $55,000.00 raise (they threatened to leave and start their own company).

19. **A**◯ $\mu = \$67,897.00; \bar{x} = \$60,000.00$
B◯ $\mu = \$67,897.00; \bar{x} = \$63,793.00$
C◯ $\mu = \$93,500.00; \bar{x} = \$87,500.00$
D◯ $\mu = \$93,500.00; \bar{x} = \$60,000.00$
E◯ $\mu = \$69,793.00; \bar{x} = \$60,000.00$
F◯ $\mu = \$69,793.00; \bar{x} = \$61,897.00$

---

1 pt The number of cats is at least 3 more than 5 times the number of dogs. If x= number of dogs, and y= number of cats, which one of the following inequalities describes this condition?

20. **A**◯ $-5x - y \geq -3$
B◯ $-5x - y \leq 3$
C◯ $5x - y \leq -3$
D◯ $5x + y \leq -3$
E◯ $5x - y \geq 3$
F◯ $5x - y \geq -3$
G◯ $-5x - y \leq -3$

---

1 pt Solve the following linear system symbolically.

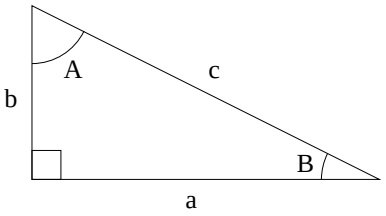
$$\begin{bmatrix} 2 & 3 \\ -1 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} a \\ b \end{bmatrix}$$

The value of x in the solution is

21. **A**◯ 3a+2b
B◯ -1a+2b
C◯ -2a+3b
D◯ -2a+1b
E◯ 2a-1b
F◯ -1a-2b
G◯ 3a-2b
H◯ 2a+3b

---

1 pt In the right triangle below, a=14.8 and c=17. The angle A is closest to?



22.**A**◯ 51.8 **B**◯ 55.0 **C**◯ 57.2 **D**◯ 60.5
E◯ 63.0 **F**◯ 66.0 **G**◯ 68.5 **H**◯ 72.2

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1 pt You take out a 3-year car loan for $12000 at 6.5% annual interest compounded monthly. How much of your second payment is principal?

23.**A**◯ $144.76 **B**◯ $180.81 **C**◯ $200.93
D◯ $221.73 **E**◯ $247.87 **F**◯ $282.96
G◯ $304.43 **H**◯ $326.24

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1 pt A recent study shows that 28% of people who smoke die of heart disease, but that only 20% of non-smokers die of heart disease. Assume that 27% of the population smokes. What percentage of people dying of heart disease are smokers?

24.**A**◯ 26.8 **B**◯ 34.1 **C**◯ 41.3 **D**◯ 47.0
E◯ 58.3 **F**◯ 62.8 **G**◯ 72.6 **H**◯ 79.3

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1 pt For the standard normal distribution, which one of the following is true?

25. **A**◯ mean = 0.00, st dev= 0.34
B◯ mean = 0.00, st dev= 0.68
C◯ mean = 1.00, st dev= 0.68
D◯ mean = 1.00, st dev= 1.00
E◯ mean = 1.00, st dev= 0.00
F◯ mean = 0.00, st dev= 1.00

1 pt During the long recession in Japan, banks lowered their interest rates on savings accounts to surprisingly low levels. At 0.06 % annual interest compounded monthly, how many years does it take to double your money? Use either continuously compounded interest or the TVM calculator. Make sure that you've entered the correct rate.

26.**A**◯ 1155 **B**◯ 1266 **C**◯ 1426 **D**◯ 1637
E◯ 1779 **F**◯ 2003 **G**◯ 2268 **H**◯ 2517

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1 pt If the transition matrix is

$$T = \begin{bmatrix} 0.2 & 0.8 \\ 0.6 & 0.4 \end{bmatrix}$$

and the probability matrix representing the present state of the system is

$$P = \begin{bmatrix} 1 & 0 \end{bmatrix}$$

then the probability of being in state 1 after 3 steps is approximately

27. **A**◯ 0.800
B◯ 0.520
C◯ 0.480
D◯ 0.400
E◯ 0.600
F◯ 0.608
G◯ 0.392
H◯ 0.200

---

1 pt Chris scored 65 on an exam where the mean was 68 and the standard deviation was 6. Assuming the test scores were normally distributed, at what percentile did Chris score?

28.**A**◯ 16 **B**◯ 18 **C**◯ 20 **D**◯ 23
E◯ 25 **F**◯ 27 **G**◯ 29 **H**◯ 31

---

1 pt Janice borrowed some money from her uncle for 61 weeks. She repaid her uncle $3,831.10 at the end of the loan.

If Janice agreed to pay 3.5% per year simple interest for this loan, how much did she borrow? (Use 52 weeks for 1 year.)

29.**A**◯ $3,640.00 **B**◯ $3,660.00 **C**◯ $3,680.00
D◯ $3,700.00 **E**◯ $3,710.00 **F**◯ $3,730.00
G◯ $3,750.00 **H**◯ $3,770.00

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1 pt You order 11 burritos to go from a Mexican restaurant, 6 with hot peppers and the rest without. However, the restaurant forgot to label them. If you pick 4 burritos at random, what is the chance that at most one has hot peppers?

30.**A**◯ 0.20 **B**◯ 0.32 **C**◯ 0.42 **D**◯ 0.47
E◯ 0.59 **F**◯ 0.73 **G**◯ 0.80 **H**◯ 0.94

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1 pt The distribution of scores on an IQ test looks like a bell curve. The mean is 114 and the standard deviation is 22.

What is the minimum score required to be in the top 10% of people taking the test?

31.**A**◯ 131 **B**◯ 133 **C**◯ 136 **D**◯ 138
E◯ 140 **F**◯ 143 **G**◯ 146 **H**◯ 148

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1 pt You toss 6 coins. What is the probability that exactly half of them land heads up?

32.**A**◯ 0.0767 **B**◯ 0.0948 **C**◯ 0.1210
D◯ 0.1527 **E**◯ 0.1889 **F**◯ 0.2471
G◯ 0.3125 **H**◯ 0.3902

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