

This exam has 5 questions, for a total of 100 points.

Write your answers in the Blue Book. Print your names & write the number of students taking this test in the upper right corner of the Blue Book. Put the test and the Blue Book in the provided envelope.

1. (20 points) A man owns 5 pairs of pants and 3 of those are bluejeans. He owns 6 shirts and again 3 of these are bluejeans. He never thinks about what he is going to wear and each morning he just randomly grabs a pair of pants and a shirt. What is the probability that he will be entirely dressed in bluejeans?

2. (20 points) The number $10!$ (10 factorial) is the product of the whole numbers between 1 and 10, so

$$10! = 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$$

Compute it and verify that it ends in 2 zeros. How many zeros does $100!$ end with?

3. (20 points) Ann & Sue bought identical boxes of stationery. Ann used hers to write 1-sheet letters, and Sue used hers to write 3-sheet letters. Ann used all the envelopes and had 50 sheets of paper left, while Sue used all of the sheets of paper and had 50 envelopes left. How many sheets of paper and how many envelopes were in the boxes to begin with?
4. (20 points) When the great mathematician C. F. Gauss (1777-1855) was a young student his teacher asked the class to add the numbers from 1 to 100. Most of the students added them up by starting with 1 and $1 + 2 = 3$, so $1 + 2 + 3 = 6$, and so on. Gauss noticed that $100 + 1 = 101$ & $99 + 2 = 101$ & $98 + 3 = 101$. Can you use this idea to find the sum of the whole numbers between 1 and 100? Can you find a formula for adding the whole numbers from 1 to n , where n is a positive integer?
5. (20 points) A regular hexagon and an equilateral triangle are both inscribed in the same circle so that hexagon and the triangle share three vertices. The radius of the circle is 8. What is the area of the region between the two polygons?

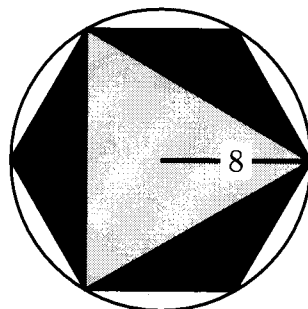


Figure for Problem 5