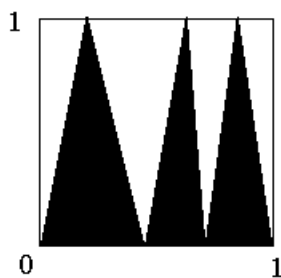


CD Exam

1. Find an equation of a line in the form $ax + by = c$, with $a > 0$ and a , b and c relatively prime, so that all points on this line are equally distant from the points $(3, 2)$ and $(4, 4)$.
2. A rectangle has perimeter 22 and area 30. What is the length of the rectangle's diagonal?
3. Find the area of the shaded region contained in the three triangles below.



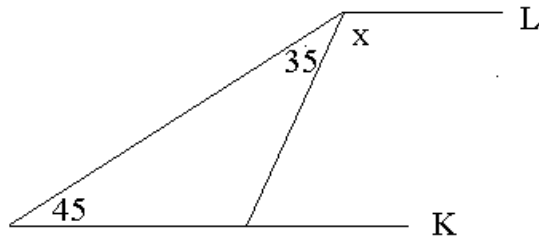
4. What is the percentage change in the area of a rectangle if its length increases by 40% and its width decreases by 30%?
5. If $f(x) = \begin{cases} 0 & \text{if } x \text{ is a rational number} \\ 1 & \text{if } x \text{ is an irrational number} \end{cases}$,
find the value of $2f(\sqrt{2}) - 3f[f(\sqrt{2})]$.
6. Suppose f is a function satisfying

$$2f(x) - f(1/x) = x^2, \text{ for } x \neq 0.$$

Find $f(2)$.

7. A square with side length 8 cm is inscribed in a circle. Find the area of the circle.

8. Let S be a square centered at the point $(-1, 3)$ in the xy -plane. If all of the vertices on the square lie either on or below the line $3x + y = 17$, find the maximum possible area of the square.
9. The lines K and L are parallel in the diagram below. What is the value of x ?



10. Suppose a rectangular solid has a base of area 6 square inches, a side of area 8 square inches, and a front of area 12 square inches. What is the volume of the solid?
11. A unit square is sitting on a flat surface as shown in the picture below. If the square begins rolling clockwise along the flat surface, what is the total distance travelled by the point A during one revolution of the square?



12. Find the area of the triangle with vertices given by $(-2, 1)$, $(0, 3)$ and $(3, -4)$.
13. The rectangular coordinates of three points in a plane are $Q(-3, -1)$, $R(-2, 3)$, and $S(1, -3)$. A fourth point T is chosen so that the line segment \overline{ST} is parallel to the line segment \overline{QR} , and the length of \overline{ST} is twice the length of \overline{QR} . Give all possible choices for the y -coordinate of T .
14. Find the length of the common chord of the two circles whose equations are $x^2 + y^2 = 4$ and $x^2 + y^2 - 6x + 2 = 0$.