

DAWSON COLLEGE

DEPARTMENT OF MATHEMATICS

FINAL EXAMINATION

ENGINEERING MATHEMATICS FOR MECHANICAL TECHNOLOGY

1. a) Solve the following system of linear equations by Gauss-Jordan elimination:

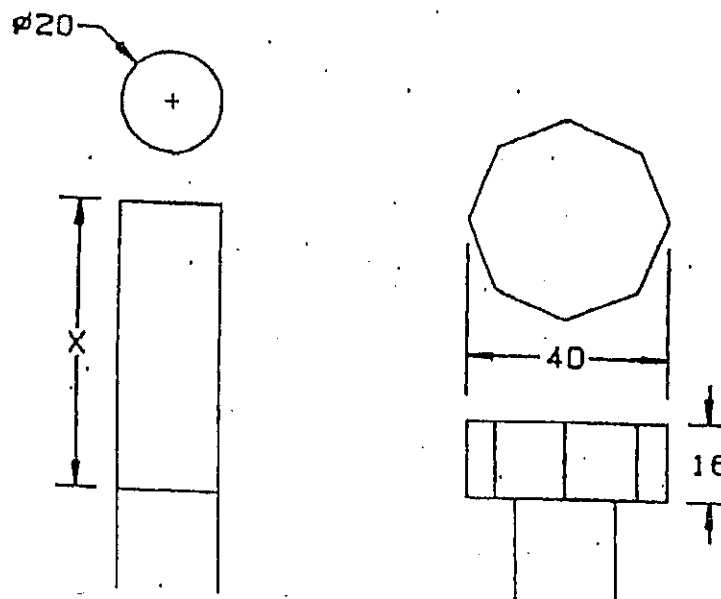
$$x + 2y - z = 1$$

$$5x + 11y - 4z = 6$$

$$4x + 8y - 3z = 4$$

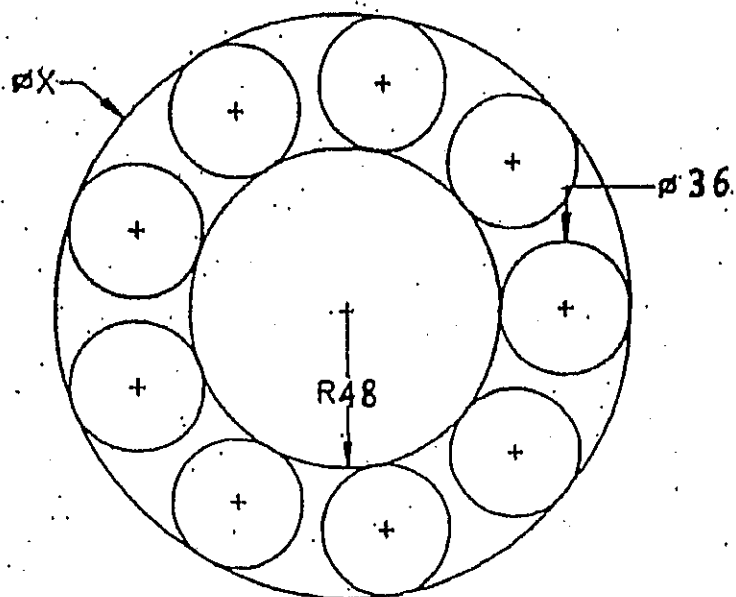
- b) A construction company orders a total of 7600 nuts, bolts, and washers for \$462.21, including \$28.21 in sales tax. In the order the total number of nuts and bolts is 400 more than the number of washers. If the nuts cost 5¢ each, the bolts cost 12¢ each, and the washers cost 3¢ each, how many of each are in the order ?

2. You got a contract to make bolts. See the following figure for specifications. Find the length X of the piece of stock needed to stamp the bolthead.

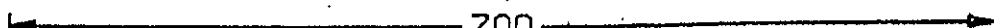


2. Find the diameter and the diameter of the pulley in the following figure:

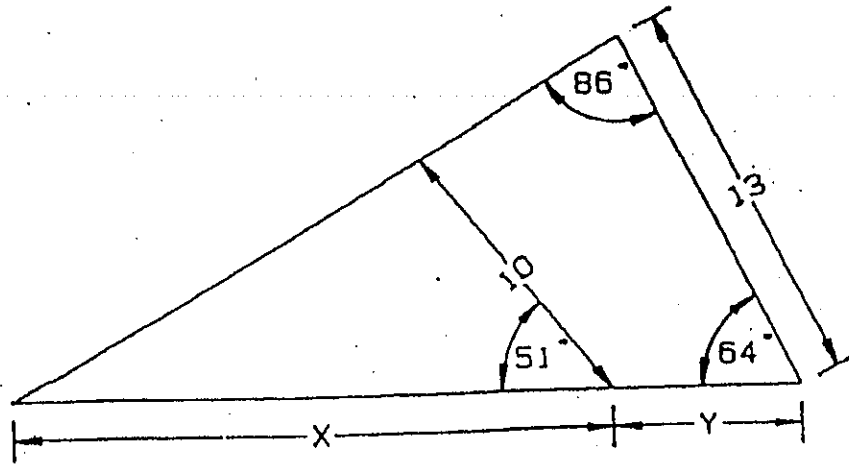
figure:



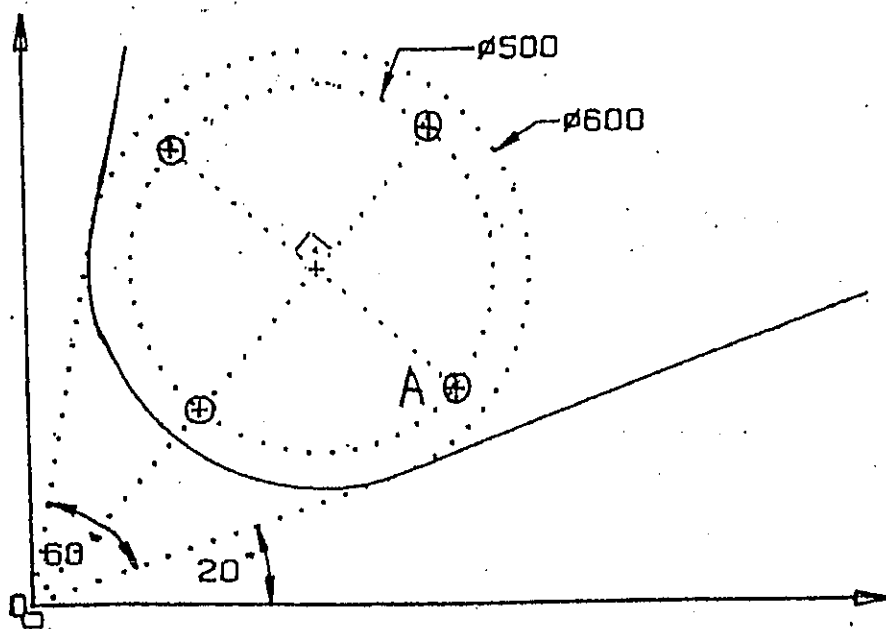
4. Find the beltlength of the drive in the following figure:



5. Find X and Y in the following figure.

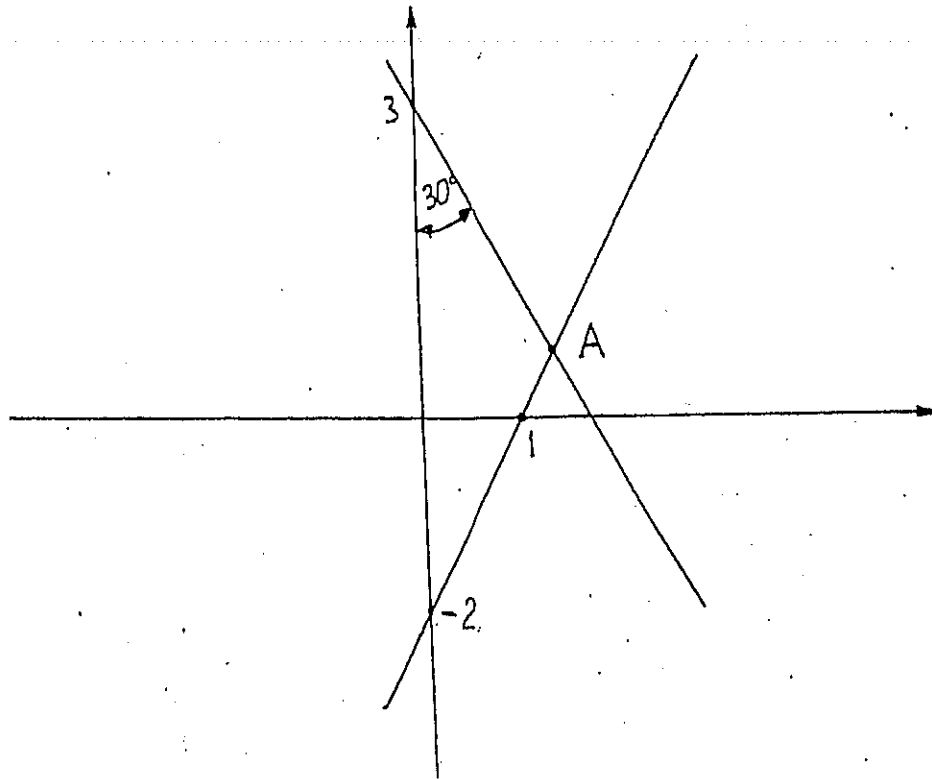


6. You have to program an NC drilling machine to drill the holes of the boltcircle in the following figure:

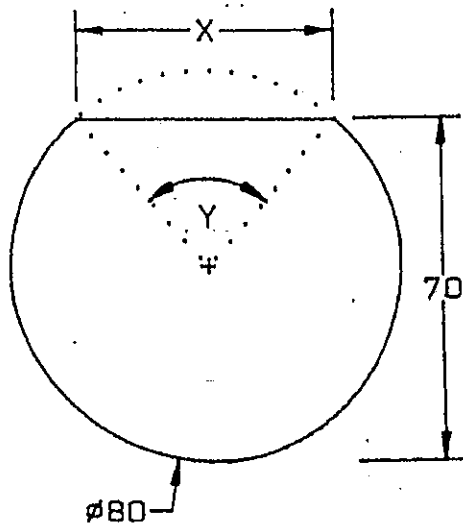


Find the coordinates of the hole A.

7. Find the coordinates of the point A in the following figure:



8. Find X and Y in the following figure:



9. a) Solve for x the following equation:

$$\sqrt{2x+1} - \sqrt{3x+4} = -1$$

b) Find the equation of the parabola passing through the points: $(1,2)$, $(-1,6)$ and $(2,9)$.

10. a) Find the radius and the center of the circle with the following equation:

$$x^2 + y^2 + 12x - 4y - 9 = 0$$

b) Find the exact value for the area of intersection of the circle $x^2 + y^2 = 62$ with

ANSWERS:

1. a) $x = -1, y = 1, z = 1$

b) $n = 2200, b = 1800, w = 3600$

2. $X = \frac{128\sqrt{2}}{\pi} \approx 57.62024$

3. $X = 168, Y \approx 9.1467$

4. $X = 1856, Y = 2044$

5. $X = 19,7539, Y = 6,1829$