FINAL EXAM

ENGINEERING MATHEMATICS I FOR MECHANICAL TECHNOLOGY

Mathematics 201-941-DW

Instructor: B. Szczepara

There are 10 problems, each worth the same amount.

1.

a) Solve the following system of linear equations

$$x - y + z = 3$$

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

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

b) Acme fertilizer Corporation buys ten kilogram bags of manure from three farmers – Adam, Bob, and Chuck. Each of Adam's bags contains 7kg of cow manure, 1kg of pig manure, and 2kg of sheep manure . Each of Bob's bags contains 3kg of cow manure, 5kg of pig manure, and 2kg of sheep manure . Each of Chuck's bags contains 4kg of cow manure, 2kg of pig manure , and 4kg of sheep manure. Acme wants to mix up 40000kg of fertilizer that will be 50% cow, 25% pig and 25% sheep. How many bags should Acme Corporation buy from each farmer?
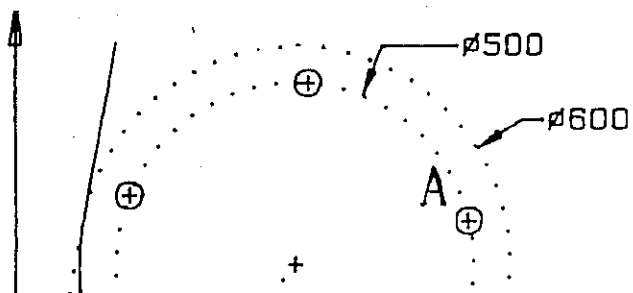
2. If the clearance of the ballbearing in the following figure is 6 mm find the diameter x of the

3. You got the contract to make bolts. See the following figure for specifications. Find the length of the piece of stock needed to stamp the bolthead.
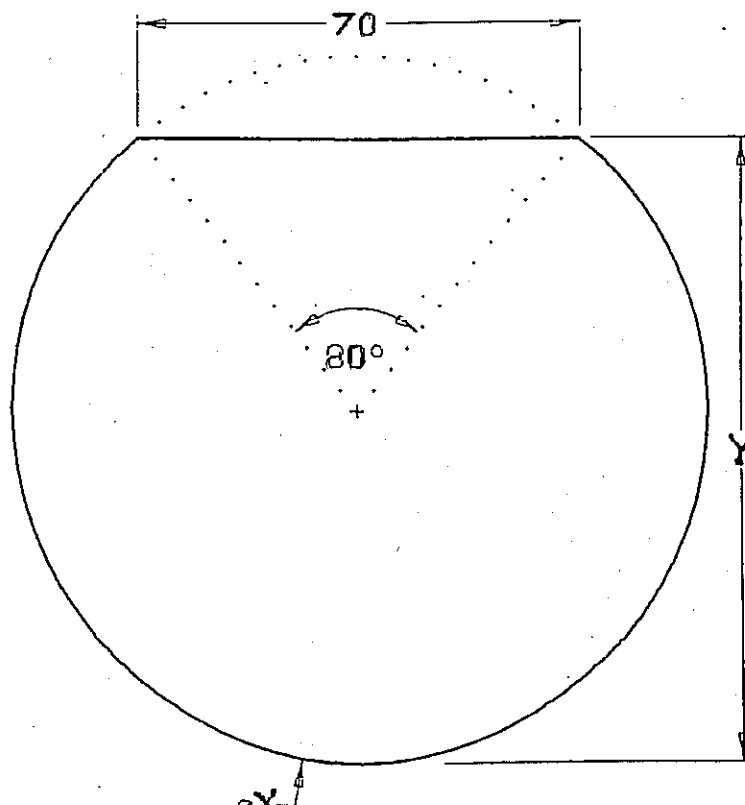
ø40

70

X

25
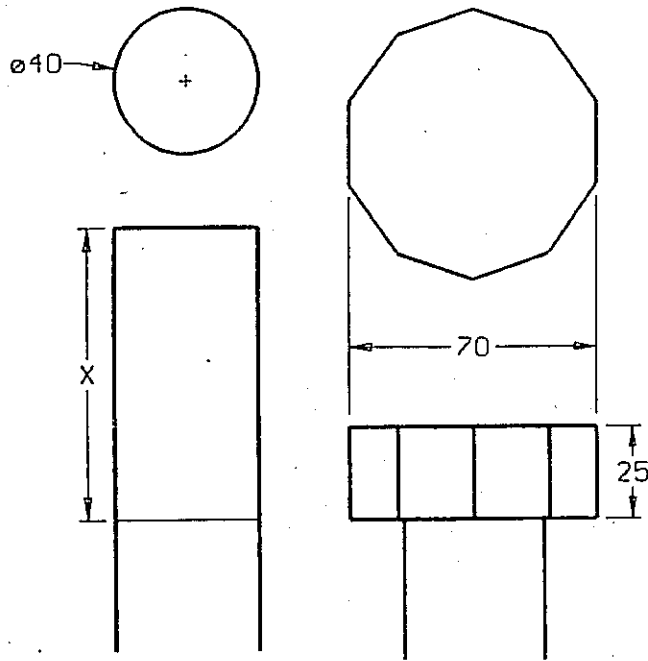
4. Find the beltlength of the drive in the following figure
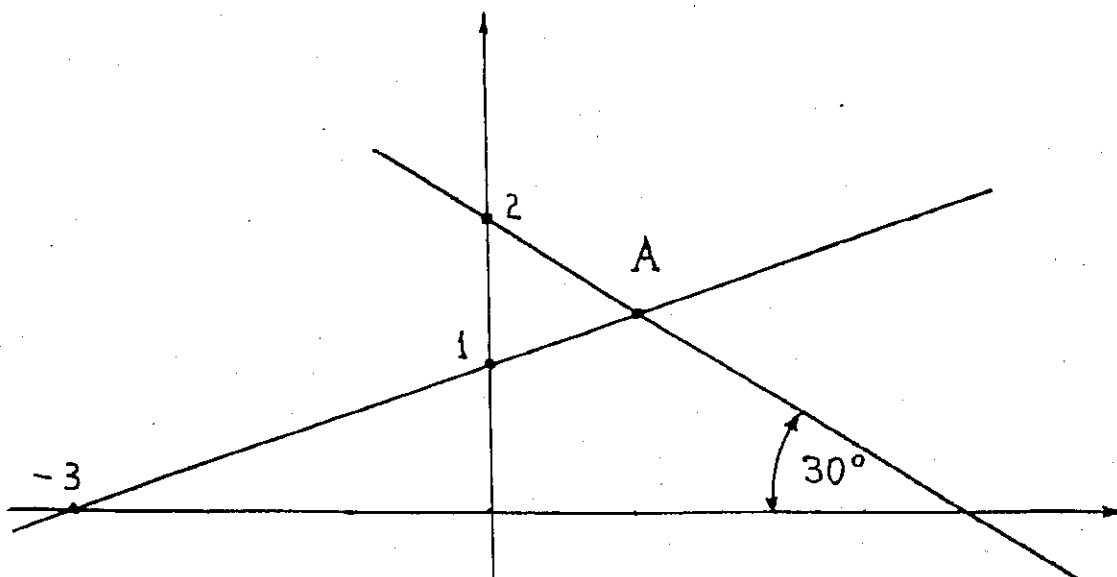
290

⌀500

⌀600

A
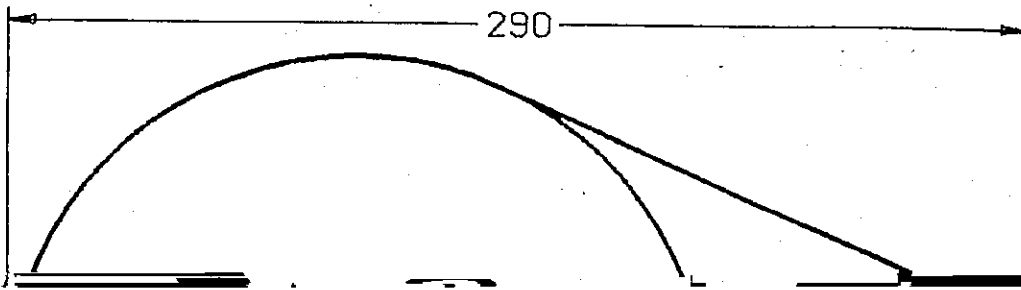
7. Find X and Y in the following figure.

8. Find the exact coordinates of the point A of intersections of the following lines.

9. a) Solve the following equation for x:

$$\sqrt{2x+1} + \sqrt{x+5} = 6$$

b) Find the equation of the parabola passing through the points $(1,2), (-1,4) \text{ and } (2,7)$.

10. a) Find the center and the radius of the circle given by the equation:

$$x^2 + y^2 - 6x + 5y + 3 = 0$$

b) Find the radius of the circle with center at the point $(2, -2)$ and tangent to the line

ANSWERS:

1. a) $x = 5$, $y = -4$, $z = -6$ b) 1750, 1250 and 1000 bags from Adam, Bob and Chuck, respectively.

2. $X = 157.17$ and $Y = 35.584$

3. $X = 79.1849$

4. The beltlength is equal 764.156

5. $A = (628.2465, 526.1071)$

6. $X = 9.495$

7. $X = 108.901$ and $Y = 96.1617$

8. $A = \left(\dfrac{1}{1+\sqrt{3}}, \dfrac{1+\sqrt{3}}{2} \right) \approx (1.0981, 1.3660)$

9. a) $x = 4$ b) $y = 2x^2 - x + 1$