2.6 Homework

Any solution based entirely on graphical
or numerical methods is not acceptable
Marks Available : 35

Question 1

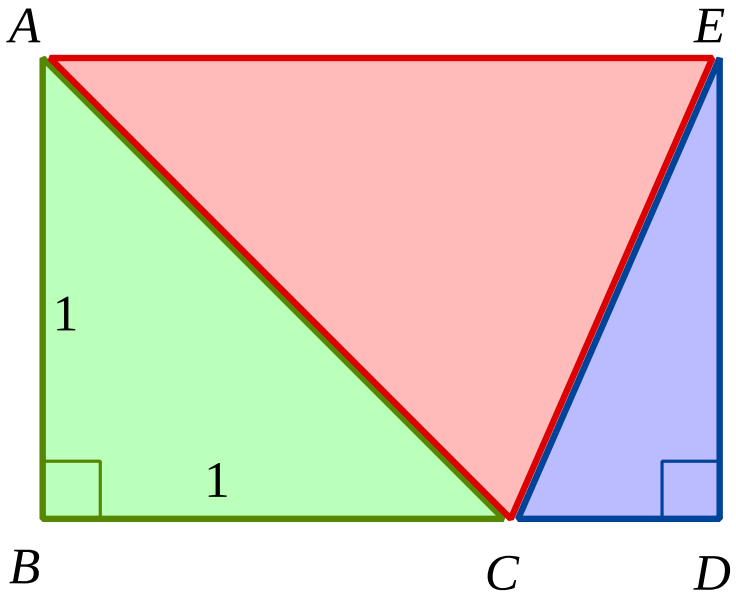
Solve the following trigonometric equation for x between 0° and 360°

$$\sin(x - 30°) = \frac{1}{2}\cos x$$

[6 marks]

Question 2

(i) Study the following diagram.
The aim is to work out the exact size of angle *CED*, and then deduce an exact value for *tan CED* that will involve a square root.



The green triangle, $\triangle ABC$ is isosceles and right angled with sides *AB* and *BC* both of length 1. The red triangle, $\triangle ACE$, is also isosceles with sides *AC* and *AE* having the same length. The blue triangle, $\triangle EDC$ is right angled.
All three triangles form a rectangle, *ABDE*, as shown.

Determine the exact value of angle *CED*, and the exact value of *tan CED*.

[5 marks]

(ii) Solve the following trigonometric equation for x between 0° and 360°

$$\cos(x - 45°) = \cos x$$

[6 marks]

Question 3

Solve the following trigonometric equation for x between 0° and 360°

$$3\sin(x + 10^\circ) = 4\cos(x - 10^\circ)$$

[6 marks]

Question 4

Prove that, $\dfrac{\tan(C + D) - \tan C}{1 + \tan(C + D)\tan C} = \tan D$

HINT: Let $(C + D) = A$ and $C = B$, then use the *tan* addition formula backwards.

[5 marks]

Question 5

Given that

$$sin\ (x - \alpha) = cos\ (x + \alpha)$$

prove that

$$tan\, x = 1$$

[7 marks]