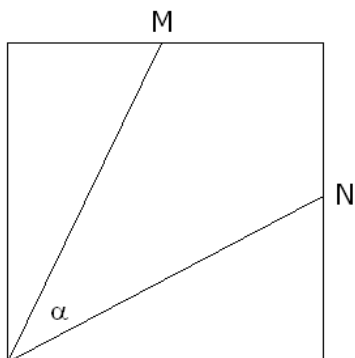


## Problem Set 24

1. Graph the function  $f(x) = -2 \cos\left(\pi x - \frac{\pi}{2}\right) - 1$  on the interval  $[-4, 4]$ .
2.  $M$  and  $N$  are midpoints of the sides of a square as shown on the picture below. Find the exact value of  $\cos \alpha$ .



3. Express  $\cos 5x \sin 13x$  as a sum or difference.
4. Express  $\sin 11x - \sin 3x$  as a product.
5. Find the exact values of  $\tan \frac{x}{2}$  and  $\sin 2x$  if  $0^\circ < x < 45^\circ$  and  $\cos x = \frac{24}{25}$ .
6. Solve each of the following equations.

(a)  $\cos x = \cot x$

(b)  $2 \sin^2 2x + \sin 4x = 0$

7. Perform the indicated operations on the complex numbers.

(a)  $\left(-\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}i\right)^3 =$

(b)  $\left(-\frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}i\right)^{23} =$

8. Find all the complex numbers satisfying the equation  $x^6 = 1$ . Present your solutions in polar form, (i.e. the polar form of  $-\frac{1}{2} - \frac{\sqrt{3}}{2}i$  is  $\cos 150^\circ + i \sin 150^\circ$ .)
9. Let  $\underline{u} = 2\underline{i} - 7\underline{j}$  and  $\underline{v} = 3\underline{i} + 8\underline{j}$ . Find each of the following.

(a)  $\underline{u} - \underline{v}$

(b) The polar form of  $\underline{u}$ .

(c) The vector we obtain when we rotate  $\underline{u}$  by  $90^\circ$ .

(d) The vector we obtain when we rotate  $\underline{u}$  by  $-90^\circ$ .

(e) The angle formed by  $\underline{u}$  and  $\underline{v}$ .

10. Solve each of the following triangles.

(a)  $b = 68$   $\beta = 110^\circ$   $\gamma = 42^\circ$

(b)  $\alpha = 34^\circ$   $b = 23$   $a = 12$

(c)  $\beta = 34^\circ$   $a = 16$   $c = 24$

(d)  $\alpha = 26^\circ$   $a = 11$   $b = 18$