

I. Evaluate the following and express your answers in rectangular form.

1. $\frac{\frac{\sqrt{3}}{2} - \frac{1}{2}i}{8\text{cis}120^\circ}$
2. $(2\text{cis}60^\circ)^2 \left(\frac{1}{\sqrt{2}}\text{cis}60^\circ \right)^{-4}$
3. $\frac{(4\text{cis}80^\circ)^2}{(2e^{\frac{5\pi}{36}i})(\sqrt{2} + \sqrt{2}i)}$
4. $\frac{(16\text{cis}41^\circ)(6\text{cis}64^\circ)}{(1 + \sqrt{3}i)^6}$

II. Do as indicated.

1. Express the following in polar and Euler's form.
 - (a) $2\sqrt{3} - 2i$
 - (b) -3
 - (c) $i - 1$
 - (d) $\cos 240^\circ - i \sin 240^\circ$
 - (e) $-\cos 100^\circ - i \sin 100^\circ$
2. Find the three cube roots of $8\text{cis}120^\circ$.
3. Find the five fifth roots of $16i - 16\sqrt{3}$
4. Solve for all complex values of z in rectangular form.
 - (a) $z^4 = -8 + 8\sqrt{3}i$

(b) $z^6 + 64 = 0$

(c) $\sqrt{2}z^3 = 1 - I$

III. Determine how many triangles can be formed given the following conditions. If exactly one exists, solve for the triangle.

1. $a = 1, b = 2, c = 3$
2. $A = 30^\circ, a = 7, b = 6$
3. $B = 60^\circ, a = 6, b = 3$
4. $A = 120^\circ, b = 10, c = 6$

IV. Solve the following

1. From a point A at the base of a mountain, the angle of elevation of the top B is 60° . After ascending the mountain 1 km. at an inclination of 30° and reaching point C, one finds the angle ACB to measure 135° . Determine the height of the mountain.
2. A metal frame has the shape of an isocoles trapezoid with base angles 75° , base 7 ft. and legs measuring 7ft. How long is the diagonal of the brace?
3. From A, a pilot flew a course of 60° for 500 km. to B. From B, he proceeded 800 km to C on a course of 120° . What is the direction and distance of a flight from C to A? What is the bearing of C from A?