

Problem 1: Give the exact solutions on $[0, 2\pi)$ to the equation

$$4 \cos^2 \left(3x - \frac{\pi}{3} \right) - 4 \cos \left(3x - \frac{\pi}{3} \right) + 4 = 3.$$

Problem 2: Give all solutions to the equation $\cos(\sin x) = 1$.

Problem 3: Prove the following identities:

(a). $\cos(A + B) \cos(A - B) = \cos^2 A + \cos^2 B - 1$.

(b). $\tan \left(x + \frac{\pi}{4} \right) = \frac{\cos x + \sin x}{\cos x - \sin x}$.

(c). $\sin 2A - \tan A = \tan A \cos 2A$

Problem 4: Consider triangle(s) $\triangle ABC$ with angles A, B, C and sides a, b, c . Solve the triangle(s) given:

(a). $a = 132.5$, $b = 108.2$, and $B = 13.1^\circ$.

(b). $a = 2.3$, $b = 10.8$, $c = 9.7$.

Problem 5: Find the exact value $\cos \left(\frac{9\pi}{8} \right)$.

Problem 6: Find the exact value (in rectangular form) of $(-2\sqrt{3} + 2i)^{15}$.

Problem 7: Given $\mathbf{v} = \langle 3, 4 \rangle$ and $\mathbf{w} = \langle 5, 12 \rangle$, find the measure of the angle θ between the two vectors.