

Problem Set 22

- Graph the function $f(x) = -2 \cos \frac{x}{2} + 1$ on the interval $[-2\pi, 2\pi]$.
- Graph the function $f(x) = 2 - \frac{1}{2} \sin \left(2x - \frac{\pi}{2} \right)$ on the interval $[-2\pi, 2\pi]$.
- Find the exact value for each of the following expressions.
 - $\frac{\csc 30^\circ + \csc 60^\circ + \csc 90^\circ}{\sec 0^\circ + \sec 30^\circ + \sec 60^\circ} =$
 - $\sin 143^\circ \cos 82^\circ + \cos 143^\circ \sin 82^\circ =$
 - $\tan 75^\circ =$
 - $\cos 45^\circ \sin 15^\circ =$
- A regular polygon of 15 sides is inscribed in a circle of radius 3 m. Find the perimeter of the polygon.
- Prove each of the following identities.
 - $\sin^4 x = \frac{3}{8} - \frac{1}{2} \cos 2x + \frac{1}{8} \cos 4x$
 - $2 \tan 2x = \frac{\cos x + \sin x}{\cos x - \sin x} - \frac{\cos x - \sin x}{\cos x + \sin x}$
 - $\tan(x + 45^\circ) = \frac{\cos x + \sin x}{\cos x - \sin x}$
 - $\frac{\sin(x + y)}{\cos(x - y)} = \frac{\tan x + \tan y}{1 + \tan x \tan y}$
- Solve each of the following equations. Present exact values, in radians.
 - $2 \cos^2 2x = \cos 2x$
 - $4 \sin^2 \frac{1}{2}x = 1$
 - $\sin x + \sqrt{3} \cos x = -1$
- Express each of the following as a sum or difference:
 - $\sin 35^\circ \cos 25^\circ =$
 - $\cos 25^\circ \cos 75^\circ =$
 - $\cos 4x \cos 2x =$
- Express each of the following as a product:
 - $\sin 50^\circ + \sin 20^\circ =$
 - $\sin 75^\circ - \sin 35^\circ =$
 - $\cos 7x + \cos 3x =$

9. Let $\underline{u} = \underline{i} - 2\underline{j}$ and $\underline{v} = 2\underline{i} + \underline{j}$. Find each of the following.
- (a) $\underline{u} + \underline{v}$
 - (b) The vector we get if we rotate $\underline{u}$ by 60° .
 - (c) $\underline{u} - \underline{v}$
 - (d) The vector we get if we rotate $\underline{u}$ by 90° .
 - (e) The vector we get if we rotate $\underline{u}$ by -90° .
10. Find the angle between the vectors $\underline{a} = 2\underline{i} + 3\underline{j}$ and $\underline{b} = 3\underline{i} - 5\underline{j}$.
11. Solve each of the following triangles.
- (a) $a = 10$, $b = 12$, and $\alpha = 32^\circ$
 - (b) $\alpha = 114^\circ$, $a = 7$ cm, and $b = 9$ cm
 - (c) $a = 22$, $b = 23$, $c = 27$