VD 5.5.1

Part 1

Solve the following trigonometric equations if $x \in [0, 2\pi)$

1. $\sin 2x - \sin x = 0$	$0, \frac{\pi}{3}, \pi, \frac{5\pi}{3}$
2. $\sin 2x + \cos x = 0$	$\frac{\pi}{2}, \frac{3\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$
3. $\sin x \cos x = -\frac{\sqrt{2}}{4}$	$\frac{5\pi}{8}, \frac{7\pi}{8}, \frac{13\pi}{8}, \frac{15\pi}{8}$
4. $\tan 2x - \cot x = 0$	$\frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$
5. $\cos 2x - \cos x = 0$	$0, \frac{2\pi}{3}, \frac{4\pi}{3}$
6. $\sin 4x + 2\sin 2x = 0$	$0, \frac{\pi}{2}, \pi, \frac{3\pi}{2}$
7. $4\cos x + \sin 2x = 0$	$\frac{\pi}{2}, \frac{3\pi}{2}$

Part 2

Rewrite the following expressions in terms of the first power of cosine (if the result is a rational expression, the numerator and denominator need to be in the first power of cosine)

1. $\sin^6 x$	$\frac{5}{16} - \frac{15}{32}\cos 2x + \frac{3}{16}\cos 4x - \frac{1}{32}\cos 6x$
2. $\cos^4 x \sin^4 x$	$\frac{3}{128} - \frac{1}{32}\cos 4x + \frac{1}{128}\cos 8x$
3. $\cos^4 x - \sin^4 x$	$\cos 2x$
4. $\sin^2 x \tan^2 x$	$\frac{3 - 4\cos 2x + \cos 4x}{4(1 + \cos 2x)}$
5. $\cos^4 \frac{x}{2}$	$\frac{3}{4} + \frac{1}{2}\cos x + \frac{1}{2}\cos 2x$
6. $\sin^2 x \cos^4 x$	$\frac{1}{16} + \frac{1}{32}\cos 2x - \frac{1}{16}\cos 4x - \frac{1}{32}\cos 6x$
7. $\sin^4 x \cos^2 x$	$\frac{1}{16} - \frac{1}{32}\cos 2x - \frac{1}{16}\cos 4x + \frac{1}{32}\cos 6x$

Part 3

Evaluate half-angle or double angle of sine, cosine or tangent functions with given information

Given	Find	Answer
1. $\sin x = \frac{3}{5}, 0 < x < \frac{\pi}{2}$	$\cos 2x$	$\frac{7}{25}$
2. $\tan x = \frac{8}{15}, \pi < x < \frac{3\pi}{2}$	$\sin \frac{x}{2}$	$\frac{4\sqrt{17}}{17}$
3. $\cot x = -\frac{7}{24}, \pi < x < \frac{3\pi}{2}$	$\sec(\frac{\pi}{2} - x)$	$-\frac{24}{25}$
4. $\sec x = -2, \frac{\pi}{2} < x < \pi$	$\sin 2x$	$-\frac{\sqrt{3}}{2}$
5. $\sin x = -\frac{4}{5}, \frac{3\pi}{2} < x < 2\pi$	$\tan \frac{x}{2}$	-2
6. $\csc x = -\frac{17}{15}, \frac{3\pi}{2} < x < 2\pi$	$\sec \frac{x}{2}$	$-\frac{\sqrt{34}}{5}$
7. $\sec x = -\frac{7}{2}, \frac{\pi}{2} < x < \pi$	$\sin \frac{x}{2}$	$\frac{3}{\sqrt{14}}$