VD 5.4

Part 1

Evaluate

1. $\cos(\sin^{-1}(\frac{4}{5}) + \tan^{-1}(\frac{6}{7}))$	$\dfrac{-3}{5\sqrt{85}}$
2. $\sin\left(\cos^{-1}\left(-\dfrac{3}{5}\right) - \sin^{-1}\left(\dfrac{40}{41}\right)\right)$	$\dfrac{156}{205}$
3. $\sec\left(\arccos\left(\dfrac{12}{13}\right) - \arctan\left(-\dfrac{8}{15}\right)\right)$	$\dfrac{221}{140}$
4. $\tan\left(\dfrac{2}{3}\pi + \arccos\left(-\dfrac{1}{5}\right)\right)$	$\dfrac{\sqrt{3}+2\sqrt{6}}{6\sqrt{2}-1}$
5. $\csc\left(\arccos\left(\dfrac{5}{13}\right) + \tan^{-1}\left(\dfrac{15}{8}\right)\right)$	$\dfrac{221}{171}$
6. $\cot\left(\dfrac{\pi}{4} + \sin^{-1}\left(\dfrac{3}{5}\right)\right)$	$\dfrac{1}{7}$
7. $\cos\left(\sin^{-1}\left(\dfrac{\sqrt{2}}{2}\right) - \tan^{-1}\left(\dfrac{1}{\sqrt{3}}\right)\right)$	$\dfrac{\sqrt{6}+\sqrt{2}}{4}$

Part 2

Rewrite the following trigonometric statements into algebraic statements (assume all angles are in the first quadrant)

1. $\sin\left(\arcsin x + \arctan x\right)$	$\dfrac{x}{\sqrt{x^2+1}}\left(1+\sqrt{1-x^2}\right)$
2. $\cos\left(\arccos x - \arcsin\dfrac{x}{2}\right)$	$\dfrac{x}{2}\left(\sqrt{4-x^2}+\sqrt{1-x^2}\right)$
3. $\tan\left(\arccos\dfrac{1}{\sqrt{4x^2+1}} - \arccos x\right)$	$\dfrac{2x^2-\sqrt{1-x^2}}{x(1+2\sqrt{1-x^2})}$
4. $\csc\left(\arcsin\dfrac{1}{x} - \arctan\dfrac{x}{4}\right)$	$\dfrac{\sqrt{x^2+16}}{x(4-\sqrt{1-x^2})}$
5. $\cot\left(\arcsin x + \arctan 2x\right)$	$\dfrac{\sqrt{1-x^2}+2x^2}{x+2x\sqrt{1-x^2}}$
6. $\sec\left(\arctan x + \arccos x\right)$	$\dfrac{\sqrt{1+x^2}}{x-\sqrt{1-x^2}}$

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$7. \sin\left(\arccos\dfrac{1}{x}-\arcsin\dfrac{1}{2x}\right)$	$\sqrt{1-x^2}\,\sqrt{1-4x^2}-2x^2$

Part 3

Solve for x if $x \in [0, 2\pi)$

$1.\ \sin\left(x+\dfrac{\pi}{3}\right)+\sin\left(x-\dfrac{\pi}{3}\right)=1$	$\dfrac{\pi}{2}$
$2.\ \cos\left(x+\dfrac{\pi}{6}\right)-\cos\left(x-\dfrac{\pi}{6}\right)=1$	$\dfrac{3}{2}\pi$
$3.\ \tan(x+\pi)+2\sin(x+\pi)=0$	$0,\dfrac{\pi}{3},\pi,\dfrac{5\pi}{3}$
$4.\ 2\sin\left(x+\dfrac{\pi}{2}\right)+3\tan(\pi-x)=0$	$\dfrac{\pi}{6},\dfrac{5\pi}{6}$
$5.\ \cos\left(x+\dfrac{\pi}{4}\right)+\cos\left(x-\dfrac{\pi}{4}\right)=1$	$\dfrac{\pi}{4},\dfrac{7\pi}{4}$
$6.\ \sin\left(x+\dfrac{\pi}{2}\right)-\cos\left(x+\dfrac{3\pi}{2}\right)=0$	$\dfrac{\pi}{4},\dfrac{3\pi}{4}$
$7.\ \sin\left(x+\dfrac{\pi}{2}\right)=-\cos^2 x$	$0,\dfrac{\pi}{2},\dfrac{3\pi}{2}$