MATH1210: HOMEWORK SOLUTIONS §0.7

1. a) $30^\circ = \pi/6$ b) $45^\circ = \pi/4$ c) $-60^\circ = -\pi/3$

   d) $240^\circ = 4\pi/3$ e) $-370^\circ = \frac{-37\pi}{18}$ f) $10^\circ = \frac{\pi}{18}$

9. a) $\tan\frac{\pi}{6} = \frac{\sqrt{3}}{3}$ b) $\sec\pi = -1$ c) $\sec\left(\frac{3\pi}{4}\right) = -\sqrt{2}$

   d) $\csc\frac{\pi}{2} = 1$ e) $\cot\left(\frac{\pi}{4}\right) = 1$ f) $\tan\left(\frac{-\pi}{4}\right) = -1$

11. a) $(1+\sin z)(1-\sin z)$

$= 1-\sin^2 z$

$= \cos^2 z$

$= \frac{1}{\sec^2 z}$

b) $(\sec t - 1)(\sec t + 1)$

$= \sec^2 t - 1$

$= \tan^2 t$

c) $\sec t - (\sin t)(\tan t)$

$= \frac{1}{\cos t} - (\sin t)\left(\frac{\sin t}{\cos t}\right)$

$= \frac{1-\sin^2 t}{\cos t}$

$= \frac{\cos^2 t}{\cos t} = \cos t$

d) $\frac{\sec^2 t - 1}{\sec^2 t} = \frac{\sec^2 t}{\sec^2 t} - \frac{1}{\sec^2 t}$

$= 1 - \cos^2 t = \sin^2 t$

13. a) $\frac{\sin u}{\csc u} + \frac{\cos u}{\sec u} = \sin^2 u + \cos^2 u = 1$

b) $(1-\cos^2 x)(1+\cot^2 x) = \sin^2 x\left(1 + \frac{\cos^2 x}{\sin^2 x}\right)$

$= \sin^2 x + \cos^2 x$

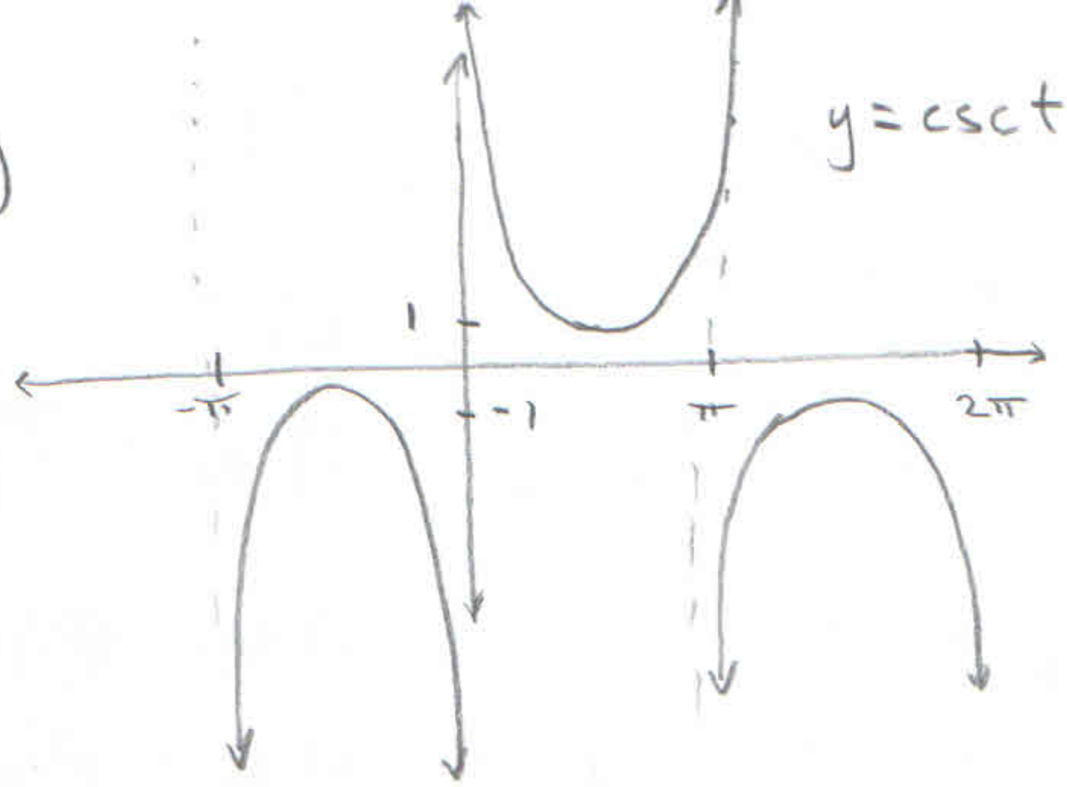
$= 1$

c) $\sin t(\csc t - \sin t) = 1 - \sin^2 t = \cos^2 t$

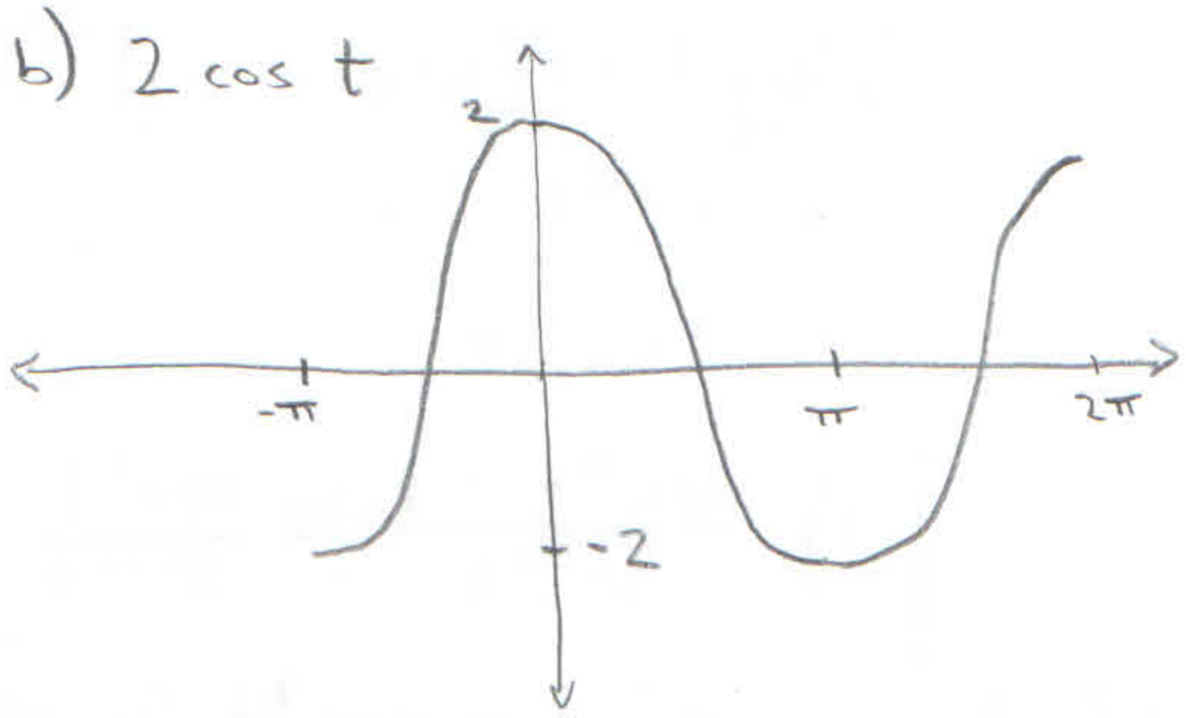
d) $\frac{1-\csc^2 t}{\csc^2 t} = \frac{1}{\csc^2 t} - 1 = \sin^2 t - 1 = -\cos^2 t$

$= -\frac{1}{\sec^2 t}$

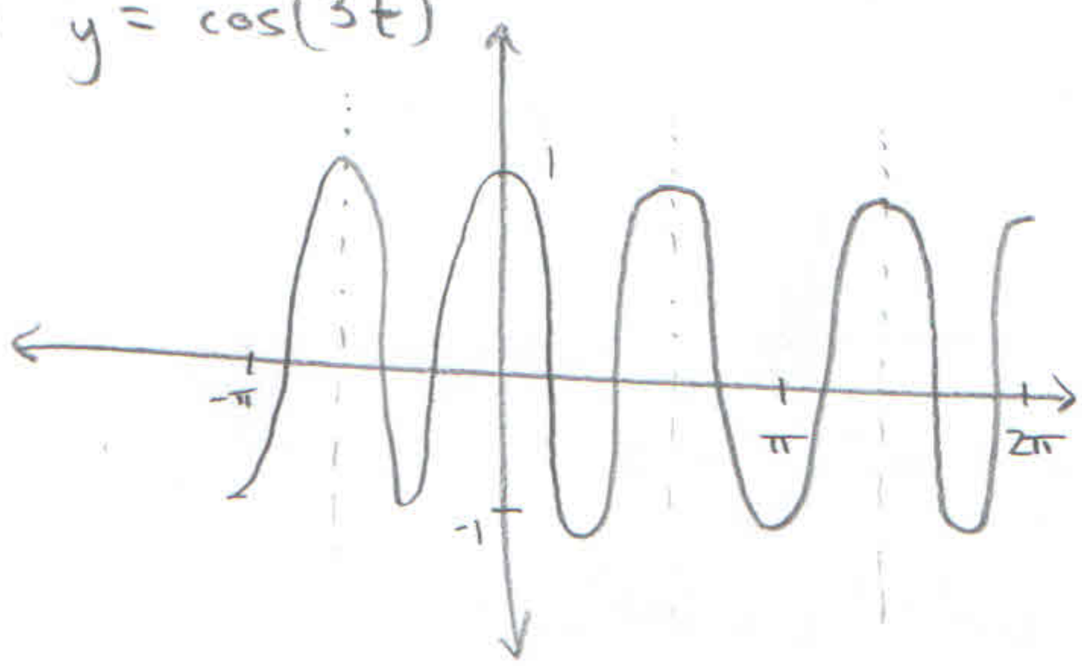
15. a)



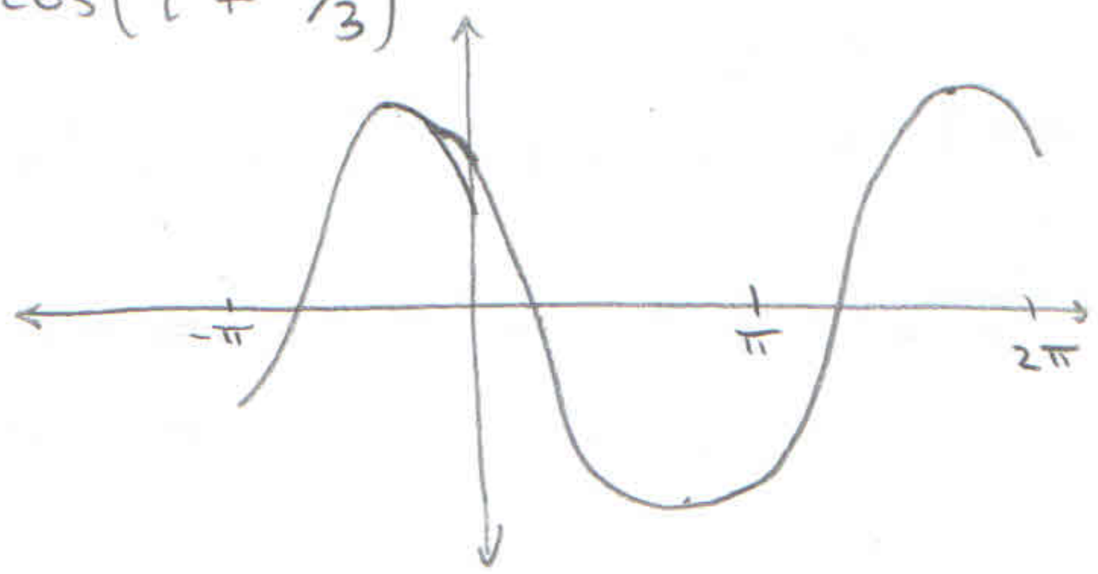
b) 2 cos t



c) y = cos(3t)



d) y = cos(t + π/3)



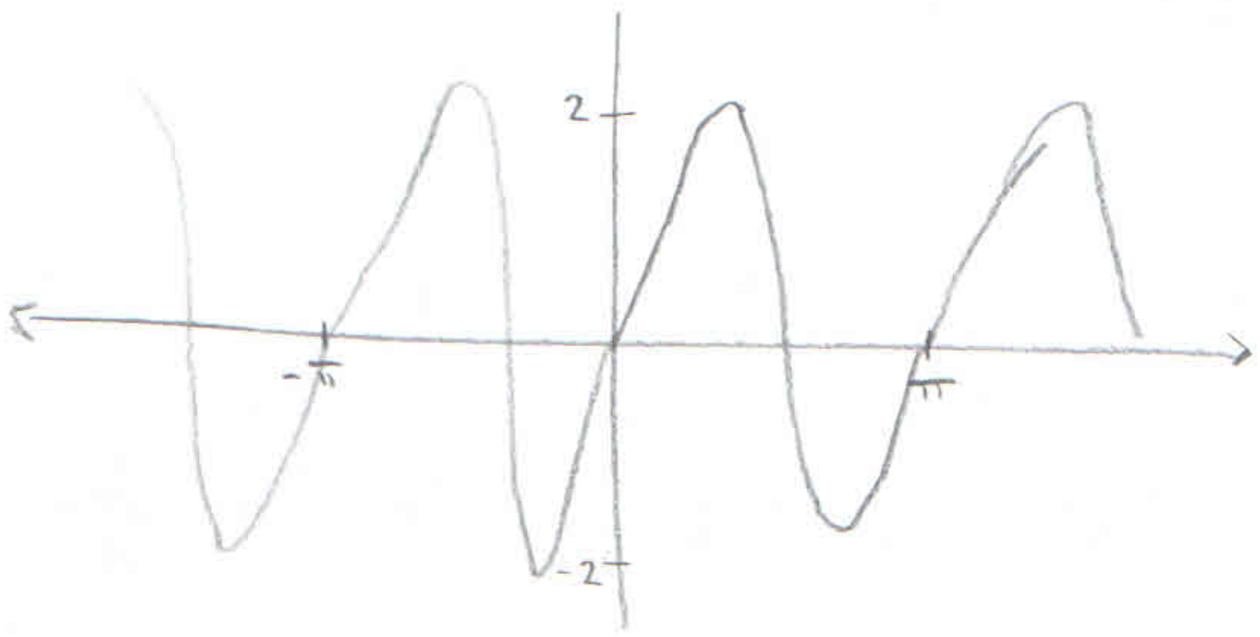
17. $y = 2 \sin 2x$

horiz shift = 0

vert. shift = 0

period = π

amplitude = 2



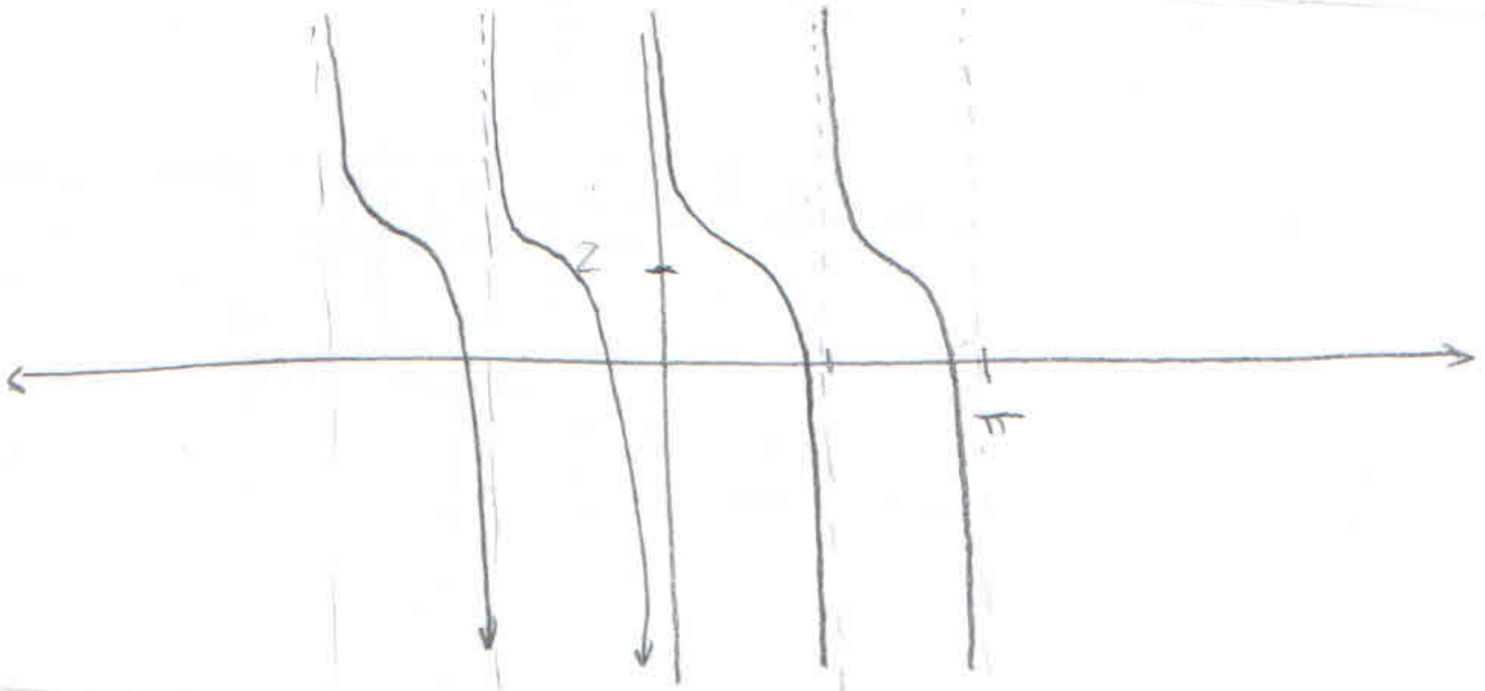
19. $y = 2 + \frac{1}{6}\cot(2x)$

horiz. shift = 0

vert. shift = +2

period = $\pi/2$

amplitude = $\frac{1}{6}$



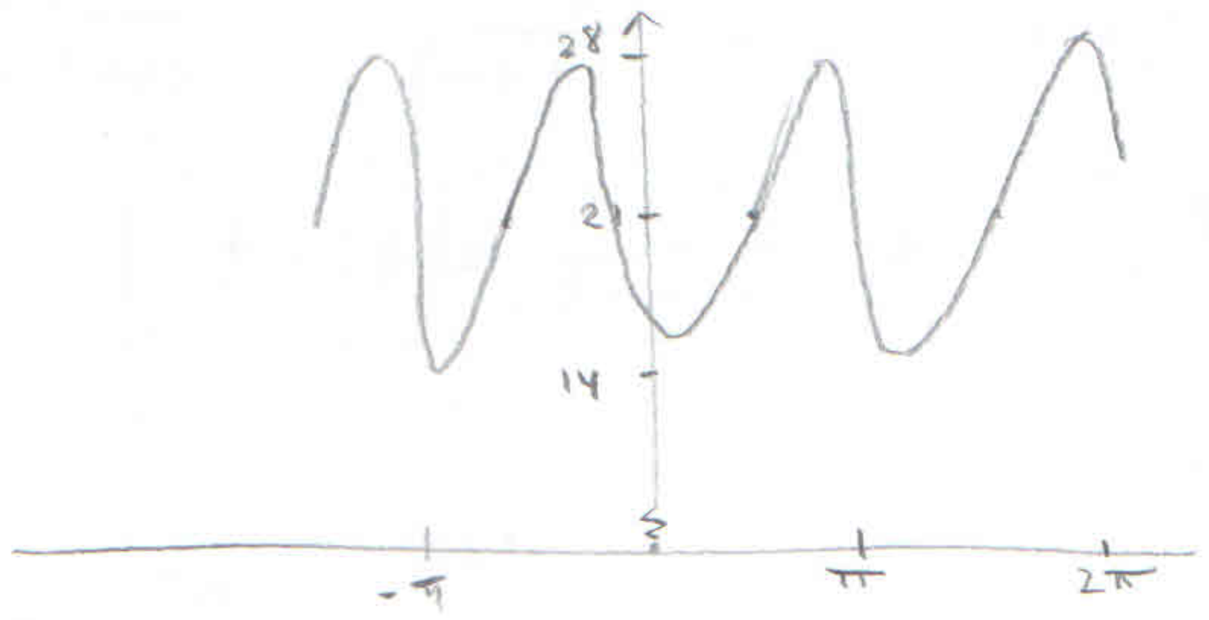
21. $y = 21 + 7\sin(2x+3)$

horiz shift = $-\frac{3}{2}$

vert. shift = 21

period = π

amplitude = 7



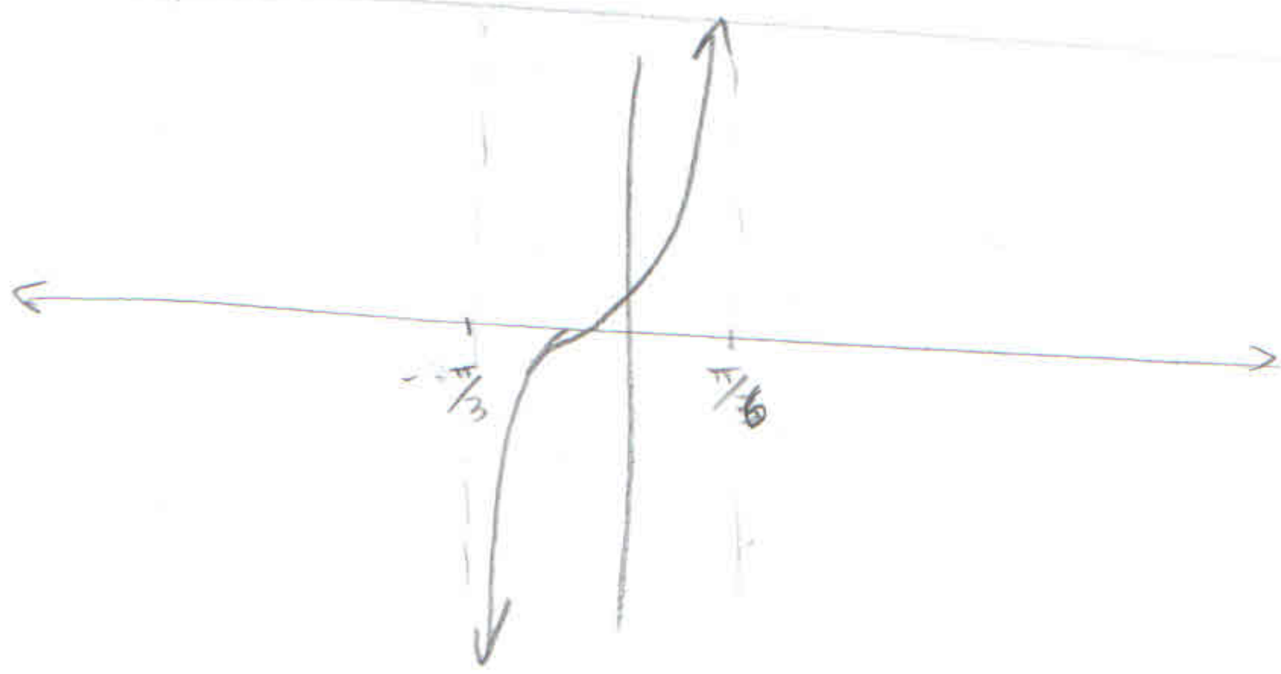
23. $y = \tan\left(2x - \frac{\pi}{3}\right)$

horiz shift = $+\frac{\pi}{6}$

vert. shift = 0

period = $\pi/2$

amplitude = 1



25. a) $t \sin t$ is even b) $\sin^2 t$ is even

c) $\csc t$ is odd d) $|\sin t|$ is even

e) $\sin(\cos t)$ is even f) $x + \sin x$ is odd

27. $\cos^2(\pi/3) = [\cos(\pi/3)]^2 = (\frac{1}{2})^2 = \boxed{\frac{1}{4}}$

29. $\sin^3(\pi/6) = [\frac{1}{2}]^3 = \boxed{\frac{1}{8}}$

31. $\sin^2(\pi/8) = \left(+\sqrt{\frac{1-\cos \pi/4}{2}}\right)^2 = \sqrt{\frac{1-\frac{\sqrt{2}}{2}}{2}}^2 = \sqrt{\frac{2-\sqrt{2}}{4}}^2$

$= \boxed{\frac{2-\sqrt{2}}{4}}$

33. $\tan(t+\pi) = \frac{\sin(t+\pi)}{\cos(t+\pi)} = \frac{\sin t \cos\pi + \sin\pi \cos t}{\cos t \cos\pi - \sin t \sin\pi}$

$= \frac{-\sin t}{-\cos t} = \boxed{\tan t}$