1 a $\quad \tan \dfrac{5\pi}{4} = \tan\left(\pi + \dfrac{\pi}{4}\right)$

$\qquad\qquad = \tan \dfrac{\pi}{4}$

$\qquad\qquad = 1$

b $\quad \tan \dfrac{-2\pi}{3} = -\tan \dfrac{2\pi}{3}$

$\qquad\qquad = -\tan\left(\pi - \dfrac{\pi}{3}\right)$

$\qquad\qquad = \sqrt{3}$

c $\quad \tan \dfrac{-29\pi}{6} = -\tan \dfrac{29\pi}{6}$

$\qquad\qquad = -\tan\left(24\pi + \dfrac{5\pi}{6}\right)$

$\qquad\qquad = -\tan\left(\dfrac{5\pi}{6}\right)$

$\qquad\qquad = \tan\left(\dfrac{\pi}{6}\right)$

$\qquad\qquad = \dfrac{1}{\sqrt{3}}$

2 a $\quad \sqrt{3}$

b $\quad \dfrac{1}{\sqrt{3}}$

c $\quad -1$

3 a $\quad \sin x = \dfrac{-\sqrt{17}}{17}$

b $\quad \cos x = \dfrac{-4\sqrt{17}}{17}$

c $\quad \tan(-x) = \dfrac{-1}{4}$

d $\quad \tan(\pi - x) = \dfrac{-1}{4}$

4 a $\quad \sin x = \dfrac{\sqrt{21}}{7}$

b $\quad \cos x = \dfrac{-2\sqrt{7}}{7}$

c $\quad \tan x = \dfrac{\sqrt{3}}{2}$

d $\quad \tan(\pi - x) = \dfrac{-\sqrt{3}}{2}$

5 a $\quad \tan x = -1$

$\qquad x = \dfrac{3\pi}{4} \text{ or } x = \dfrac{7\pi}{4}$

b $\quad \tan x = \sqrt{3}$

$\qquad x = \dfrac{\pi}{3} \text{ or } x = \dfrac{4\pi}{3}$

c $\tan x = \dfrac{1}{\sqrt{3}}$

$\qquad x = \dfrac{\pi}{6}$ or $x = \dfrac{7\pi}{6}$

d $\tan 2x = 1$

$\qquad 2x = \dfrac{\pi}{4}$ or $\dfrac{5\pi}{4}$ or $-\dfrac{3\pi}{4}$ or $-\dfrac{7\pi}{4}$

$\qquad x = -\dfrac{7\pi}{8}$ or $x = -\dfrac{3\pi}{8}$

$\qquad$ or $x = \dfrac{\pi}{8}$ or $x = \dfrac{5\pi}{8}$

e $\tan 2x = \sqrt{3}$

$\qquad 2x = \dfrac{\pi}{3}$ or $\dfrac{4\pi}{3}$ or $-\dfrac{2\pi}{3}$ or $-\dfrac{5\pi}{3}$

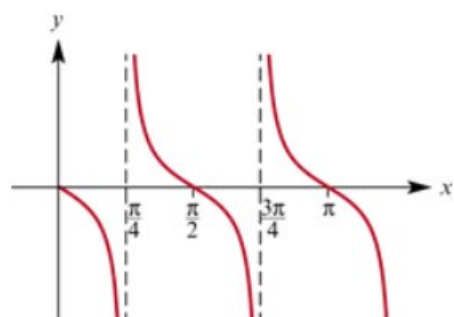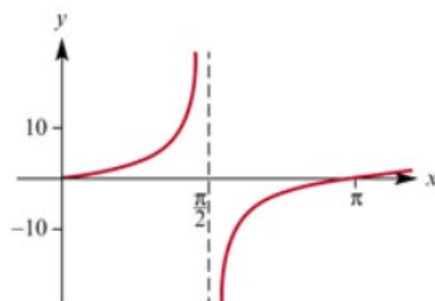$\qquad x = -\dfrac{5\pi}{6}$ or $x = -\dfrac{\pi}{3}$ or $x = \dfrac{\pi}{6}$

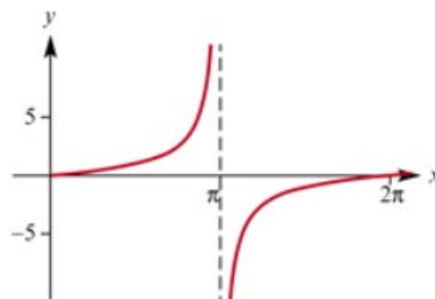$\qquad$ or $x = \dfrac{2\pi}{3}$

f $\tan 2x = -\dfrac{1}{\sqrt{3}}$

$\qquad 2x = \dfrac{5\pi}{6}$ or $\dfrac{11\pi}{6}$ or $x = -\dfrac{\pi}{6}$ or $-\dfrac{7\pi}{6}$

$\qquad x = -\dfrac{7\pi}{12}$ or $x = -\dfrac{\pi}{12}$
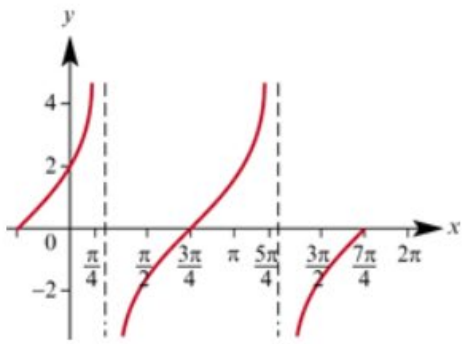
$\qquad$ or $x = \dfrac{5\pi}{12}$ or $x = \dfrac{11\pi}{12}$

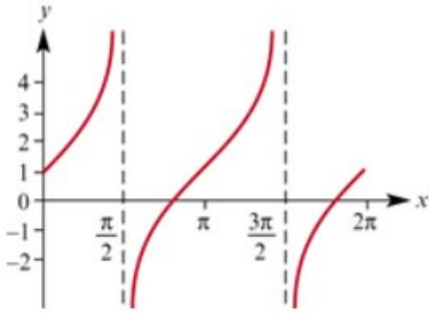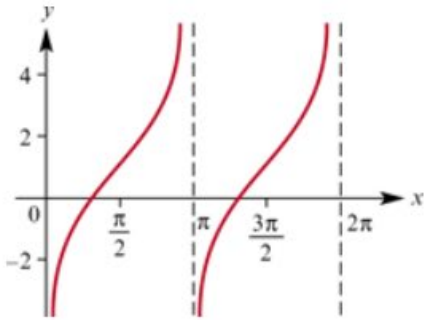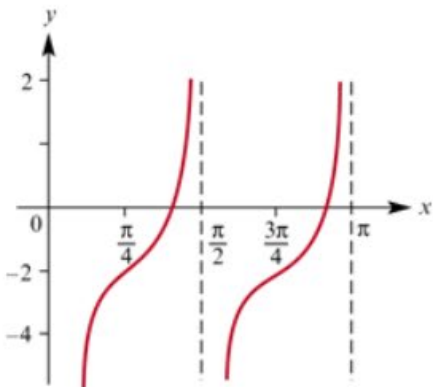**6 a** $\tan\left(2\left(x - \dfrac{\pi}{4}\right)\right) = 1$

$\qquad 2\left(x - \dfrac{\pi}{4}\right) = \dfrac{\pi}{4}$ or $\dfrac{5\pi}{4}$ or $\dfrac{9\pi}{4}$ or $\dfrac{13\pi}{4}$

$\qquad x - \dfrac{\pi}{4} = \dfrac{\pi}{8}$ or $\dfrac{5\pi}{8}$ or $\dfrac{9\pi}{4}$ or $\dfrac{13\pi}{8}$

$\qquad x = \dfrac{3\pi}{8}$ or $\dfrac{7\pi}{8}$ or $\dfrac{11\pi}{8}$ or $\dfrac{15\pi}{8}$
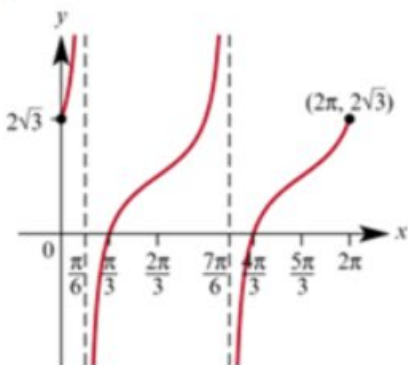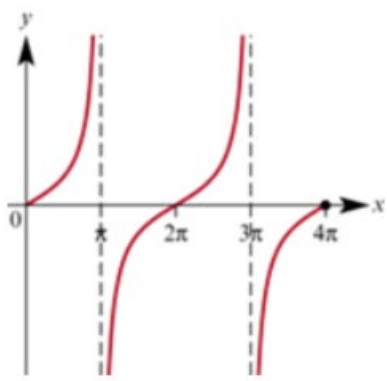
b $\tan\left(2\left(x - \dfrac{\pi}{4}\right)\right) = -1$

$\qquad 2\left(x - \dfrac{\pi}{4}\right) = \dfrac{3\pi}{4}$ or $-\dfrac{\pi}{4}$ or $-\dfrac{5\pi}{4}$ or $-\dfrac{9\pi}{4}$

$\qquad x - \dfrac{\pi}{4} = \dfrac{3\pi}{8}$ or $\dfrac{-\pi}{8}$ or $-\dfrac{5\pi}{8}$ or $-\dfrac{9\pi}{8}$

$\qquad x = -\dfrac{7\pi}{8}$ or $-\dfrac{3\pi}{8}$ or $\dfrac{\pi}{8}$ or $\dfrac{5\pi}{8}$

c $-\dfrac{13\pi}{18}, -\dfrac{7\pi}{18}, -\dfrac{\pi}{18}, \dfrac{5\pi}{18}, \dfrac{11\pi}{18}, \dfrac{17\pi}{18}$

d $-\dfrac{\pi}{6}$

7 a

b

c

d

e

f

g

h

i

8 a .

b

c