$$\lim_{x\to 1}\frac{\left(\sqrt{5x+4}-3\right)}{(x-1)}\cdot\frac{\left(\sqrt{5x+4}+3\right)}{\left(\sqrt{5x+4}+3\right)}$$

$$=\lim_{x\to 1}\frac{\overbrace{(5x+4)-9}^{5x-5}}{(x-1)\left(\sqrt{5x+4}+3\right)}=\lim_{x\to 1}\frac{5\cancel{(x-1)}}{\cancel{(x-1)}\left(\sqrt{5x+4}+3\right)}$$

$$=\frac{5}{\underbrace{\sqrt{5\cdot 1+4}}_{\sqrt{9}}+3}=\boxed{\frac{5}{6}}$$

f

g

h

$$\text{\# people}\xrightarrow{f}\text{cost of candy}\xrightarrow{g}\text{lbs of weight loss}\xrightarrow{h}\text{hours @ gym}$$

$$(g\circ f)(x)$$

$$\sin^2\theta + \cos^2\theta = 1 \Rightarrow \cos^2\theta = 1-\sin^2\theta$$
$$1 + \cot^2\theta = \csc^2\theta$$
$$\cot^2\theta = \csc^2\theta - 1$$
$$\tan^2\theta + 1 = \sec^2\theta$$
$$\tan^2\theta = \sec^2\theta - 1$$

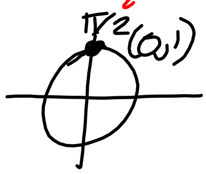
$$\sin 2\theta = 2\sin\theta\cos\theta$$
$$\cos 2\theta = \cos^2\theta - \sin^2\theta$$
$$= 2\cos^2\theta - 1$$
$$= 1 - 2\sin^2\theta$$

Find $\displaystyle\lim_{x\to\frac{\pi}{4}} \frac{\cos(2x)}{\cos(x)-\sin(x)}$.

$$= \lim_{x\to\frac{\pi}{4}} \frac{\cos^2 x - \sin^2 x}{\cos x - \sin x}$$
$$= \lim_{x\to\frac{\pi}{4}} \frac{\cancel{(\cos x - \sin x)}(\cos x + \sin x)}{\cancel{\cos x - \sin x}}$$
$$= \cos\frac{\pi}{4} + \sin\frac{\pi}{4} = \frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2} = \boxed{\sqrt{2}}$$

Find $\displaystyle\lim_{\theta\to\frac{\pi}{2}} \tan^2(\theta)[1-\sin(\theta)]$.

$$= \lim_{\theta\to\frac{\pi}{2}} \frac{\sin^2\theta}{\cos^2\theta}(1-\sin\theta)\frac{(1+\sin\theta)}{(1+\sin\theta)}$$
$$= \lim_{\theta\to\frac{\pi}{2}} \frac{\sin^2\theta}{\cos^2\theta}\cdot\frac{1-\sin^2\theta}{1+\sin\theta}$$
$$= \lim_{\theta\to\frac{\pi}{2}} \frac{\sin^2\theta}{\cancel{\cos^2\theta}}\cdot\frac{\cancel{\cos^2\theta}}{1+\sin\theta}$$



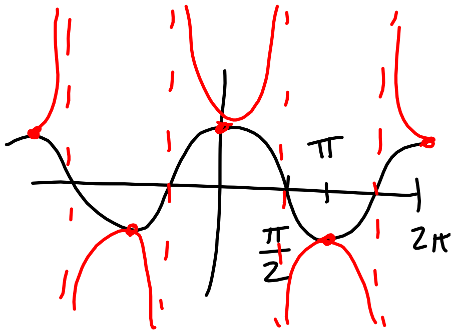
$$= \frac{1^2}{1+1} = \boxed{\frac{1}{2}}$$

24. $\displaystyle\lim_{x\to 1}\left(1 - \left[\!\left[-\frac{x}{2}\right]\!\right]\right)$

$$= \lim_{x\to 1}(1) - \lim_{x\to 1}\left[\!\left[-\frac{x}{2}\right]\!\right]$$
$$= 1 - (-1) = \boxed{2}$$

20. $\lim_{x \to \frac{\pi}{2}} \sec x$

does not exist



52. $f(x) = \tan \frac{\pi x}{2}$

discuss the (dis) continuity

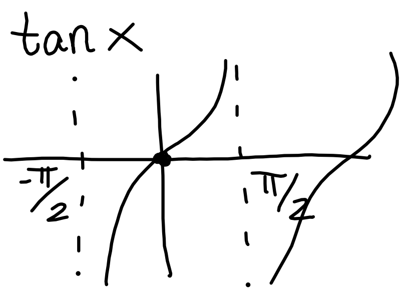
period = $\frac{\text{original period}}{\text{x-coeff.}}$

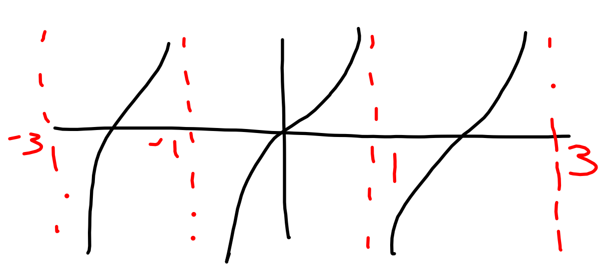
$y = a \cdot f(bx+c)+d$

tan

per = $\frac{\pi}{b}$

$\frac{\pi}{\pi/2} = 2$





$\tan \frac{\pi x}{2}$ has vertical asymptotes for all $x = 2n+1$, $n \in \mathbb{Z}$

& is continuous on all intervals $(2n-1, 2n+1)$