2) $f(x) = -2\sin x \quad @\ x = \frac{3\pi}{4}$

$f'(x) = -2\cos x$

$f'\left(\frac{3\pi}{4}\right) = -2\cos\left(\frac{3\pi}{4}\right) = -2 \cdot -\frac{\sqrt{2}}{2} = \sqrt{2}$

$f\left(\frac{3\pi}{4}\right) = -2\sin\left(\frac{3\pi}{4}\right) = -2 \cdot \frac{\sqrt{2}}{2} = -\sqrt{2}$

$y + \sqrt{2} = \sqrt{2}\left(x - \frac{3\pi}{4}\right)$

$y = \sqrt{2}x - \frac{3\pi}{4}\sqrt{2} - \sqrt{2}$

4) $f(x) = \dfrac{x - \cos x}{x^2 + \cot x}$

$$f'(x) = \frac{(x^2 + \cot x)(1 + \sin x) - (x - \cos x)(2x - \csc^2 x)}{(x^2 + \cot x)^2}$$

5) $f(x) = \dfrac{x^2 + \sec x}{x - 2e^x}$

$$f'(x) = \frac{(x - 2e^x)(2x + \sec x \tan x) - (x^2 + \sec x)(1 - 2e^x)}{(x - 2e^x)^2}$$

$\frac{d}{dx}(\sin x) = \cos x$ $\frac{d}{dx}(\cos x) = -\sin x$

$\frac{d}{dx}(\tan x) = \sec^2 x$ $\frac{d}{dx}(\cot x) = -\csc^2 x$

$\frac{d}{dx}(\sec x) = \sec x \tan x$ $\frac{d}{dx}(\csc x) = -\csc x \cot x$

$\tan x = \frac{\sin x}{\cos x}$

$$d\left(\frac{\sin x}{\cos x}\right) = \frac{\cos x \cdot \cos x - \sin x(-\sin x)}{\cos^2 x} = \frac{\cos^2 x + \sin^2 x}{\cos^2 x}$$

$$= \frac{1}{\cos^2 x} = \sec^2 x$$

$\sec x = \frac{1}{\cos x}$

$$\frac{d}{dx}\left(\frac{1}{\cos x}\right) = \frac{\cos x \cdot 0 - 1 \cdot (-\sin x)}{\cos^2 x} = \frac{\sin x}{\cos^2 x}$$

$$= \frac{\sin x}{\cos x} \cdot \frac{1}{\cos x} = \tan x \sec x = \sec x \tan x$$

$f(1)=2$ $\quad g(1)=2$ $\quad f'(1)=1$ $\quad f'(2)=3$

$g'(1)=6$ $\quad g'(2)=4$

Find $F'(1)$ if $F(x)=f(g(x))$

$$F'(x)=f'(g(x))\cdot g'(x)$$

$$F'(1)=f'(g(1))\cdot g'(1)$$

$$=f'(2)\cdot 6$$

$$=3\cdot 6=18$$