#7 p. 181 find $\frac{dy}{dx}$

$$y = \sqrt{x} + 1 + \frac{1}{\sqrt{x}}$$

$$y = x^{1/2} + 1 + \frac{1}{x^{1/2}}$$

$$y = x^{1/2} + 1 + x^{-1/2}$$

$$\frac{dy}{dx} = \frac{1}{2}x^{-1/2} + 0 - \frac{1}{2}x^{-3/2}$$

$$= \frac{1}{2\sqrt{x}} - \frac{1}{2x^{3/2}}$$

#8 $y = x\sqrt{2x+1}$

$$y = x \cdot (2x+1)^{1/2}$$

$u = x$ $\quad v = (2x+1)^{1/2}$

$u' = 1$ $\quad v' = \frac{1}{2}(2x+1)^{-1/2} \cdot 2$

$= (2x+1)^{-1/2}$

$$\frac{dy}{dx} = u'v + uv'$$

$$= (2x+1)^{1/2} + x \cdot (2x+1)^{-1/2}$$

$$= \sqrt{2x+1} + \frac{x}{\sqrt{2x+1}}$$

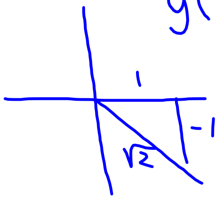
$$= \frac{2x+1}{\sqrt{2x+1}} + \frac{x}{\sqrt{2x+1}}$$

$$= \frac{2x+1+x}{\sqrt{2x+1}} = \frac{3x+1}{\sqrt{2x+1}}$$

p. 153 # 43

$$x = \sec^2 t - 1 \quad , \quad t = -\frac{\pi}{4}$$
$$y = \tan t$$

$$x\left(-\frac{\pi}{4}\right) = \sec^2\left(-\frac{\pi}{4}\right) - 1$$
$$= (\sqrt{2})^2 - 1 = 1 = x_1$$
$$y\left(-\frac{\pi}{4}\right) = \tan\left(-\frac{\pi}{4}\right) = -1 = y_1$$



$$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{\sec^2 t}{\frac{d}{dt}(\sec^2 t - 1)}$$
$$= \frac{\sec^2 t}{d/dt(\tan^2 t)}$$
$$= \frac{\cancel{\sec^2 t}\ 1}{2\tan t\ \cancel{\sec^2 t}}$$
$$= \left.\frac{1}{2\tan\left(-\frac{\pi}{4}\right)}\right|_{t=-\frac{\pi}{4}}$$
$$= -\frac{1}{2}$$

$$x_1 = 1 \quad y_1 = -1 \quad m = -\frac{1}{2}$$
tan line: $y = -1 - \frac{1}{2}(x - 1)$
$$= -1 - \frac{1}{2}x + \frac{1}{2}$$
$$y = -\frac{1}{2}x - \frac{1}{2}$$

Topic: Pythagorean Trig Identities.

MOAPI: $\sin^2 x + \cos^2 x = 1$

$$\frac{\sin^2 x}{\sin^2 x} + \frac{\cos^2 x}{\sin^2 x} = \frac{1}{\sin^2 x}$$

$$1 + \cot^2 x = \csc^2 x$$

$\rightarrow$ $\csc^2 x - \cot^2 x = 1$

$\rightarrow$ $\csc^2 x - 1 = \cot^2 x$

$$\frac{\sin^2 x}{\cos^2 x} + \frac{\cos^2 x}{\cos^2 x} = \frac{1}{\cos^2 x}$$

$$\tan^2 x + 1 = \sec^2 x$$

$\rightarrow$ $\sec^2 x - \tan^2 x = 1$

$\rightarrow$ $\sec^2 x - 1 = \tan^2 x$

Hint: differentiability.

1. fcn defined and continuous
2. no corner, cusp, vertical tangent

look for: $\sqrt{(-)}$

$$\frac{\text{something}}{0}$$