

3.5

$$31) y = 4 + \cot x - 2 \csc x$$

$$y' = -\csc^2 x + 2 \csc x \cot x$$

$$y'(\frac{\pi}{2}) = -1 + 0$$

$$y'(\frac{\pi}{2}) = -1$$

$$(\frac{\pi}{2}, 2), m = -1$$

$$y = mx + b$$

$$2 = -1(\frac{\pi}{2}) + b$$

$$2 + \frac{\pi}{2} = b$$

$$y = -x + (\frac{\pi}{2} + 2)$$

$$y' = 0$$

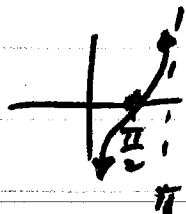
$$x \approx 1.0471976$$

$$y = 2.268$$

$$25) \frac{d}{dx} \tan x = \frac{\sin x}{\cos^2 x}$$

$$\frac{\cos x (\cos x) - (-\sin x)(\sin x)}{(\cos x)^2}$$

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



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$$y = \sec x$$

$$y' = \sec x \tan x$$

$$y'(0) = \sec(0) \tan(0) = 0$$

$$y = \cos x$$

$$y' = -\sin x$$

$$y'(0) = -\sin(0) = 0$$

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$$y = 1 + \sqrt{2} \csc x + \cot x$$

$$y' = -\sqrt{2} \csc x \cot x + -\csc^2 x$$

$$y'(\frac{\pi}{4}) = -4$$

$$(\frac{\pi}{4}, 4)$$

m=0

$$y' = 0$$

$$(2.356, 0)$$

$$4 = -4(\frac{\pi}{4}) + b$$

$$y(2.3561945)$$

$$4 + \pi = b$$

$$y = -4x + (4 + \pi)$$

$$(2.356, 1.586)$$

$$y = 1.586$$

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$$y = \sqrt{2} \cos x$$

$$(\frac{\pi}{4}, 1)$$

$$y' = -\sqrt{2} \sin x$$

$$y'(\frac{\pi}{4}) = -\sqrt{2} \sin(\frac{\pi}{4}) = -1$$

$$m = 1, (\frac{\pi}{4}, 1)$$

TANGENT

$$y = mx + b$$

NORMAL

$$y = mx + b$$

$$1 = -1(\frac{\pi}{4}) + b$$

$$1 = 1(\frac{\pi}{4}) + b$$

$$1 + \frac{\pi}{4} = b$$

$$1 - \frac{\pi}{4} = b$$

$$\boxed{y = -1x + (1 + \frac{\pi}{4})}$$

$$\boxed{y = x + (1 - \frac{\pi}{4})}$$

3.5

3)  $y = \frac{1}{x} + 5 \sin x$   
 $y = x^{-1} + 5 \sin x$   
 $y' = -x^{-2} + 5 \cos x$   
 $y' = \boxed{\frac{-1}{x^2} + 5 \cos x}$

7)  $y = \frac{4}{\cos x} = 4 \sec x$   
 $y' = \boxed{4 \sec x \tan x}$

9)  $y = \frac{\cot x}{1 + \cot x}$   
 $y' = \frac{[-\csc^2 x (1 + \cot x)] - [-\csc^2 x (\cot x)]}{(1 + \cot x)^2}$

$y' = \frac{-\csc^2 x + \cancel{-\csc^2 x \cot x} + \cancel{\csc^2 x \cot x}}{(1 + \cot x)^2}$

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

22)  $y = \sec x$   $y\left(\frac{\pi}{4}\right) \approx \left(\frac{\pi}{4}, 1.414\right)$

$y' = \sec x \tan x$   
 $y'\left(\frac{\pi}{4}\right) = \sec\left(\frac{\pi}{4}\right) \tan\left(\frac{\pi}{4}\right) \approx 1.414 = m$

TANGENT:  $1.414 = 1.414\left(\frac{\pi}{4}\right) + b$   $\boxed{y = 1.414x + .303}$   
 $.303 = b$

NORMAL:  $m = -.707$ ,  $\left(\frac{\pi}{4}, 1.414\right)$   $b = 1.970$

$1.414 = -.707\left(\frac{\pi}{4}\right) + b$   $\boxed{y = -.707x + 1.970}$