

Presentation Problem 3-2 #22 pg 198

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Find the equation of the tangent line and normal line to the given curve at the specified point

$$y = \frac{\sqrt{x}}{x+1}, (4, 0.4)$$

$$\frac{dy}{dx} = \frac{(x+1) \frac{d}{dx} \sqrt{x} - (\sqrt{x}) \frac{d}{dx} (x+1)}{(x+1)^2} =$$

$$\frac{dy}{dx} = \frac{(x+1) \cdot \frac{1}{2\sqrt{x}} - (\sqrt{x} \cdot 1)}{(x+1)^2} = \frac{dy}{dx} = \frac{\frac{x+1}{2\sqrt{x}} - \frac{\sqrt{x}}{1}}{(x+1)^2} \text{ find h.c.d.}$$

$$\frac{dy}{dx} = \frac{\frac{x+1}{2\sqrt{x}} - \frac{2\sqrt{x}}{2\sqrt{x}}}{(x+1)^2} = \frac{\frac{x+1-2x}{2\sqrt{x}}}{(x+1)^2} \quad \frac{dy}{dx} = \frac{1-x}{2\sqrt{x}} \cdot \frac{1}{(x+1)^2} \text{ plug in 4 for } x$$

to get slope

$$\frac{\left(\frac{1-4}{2\sqrt{4}}\right)}{(4+1)^2} - \left(\frac{-3}{4}\right) = \frac{-3}{100} = m = -.03$$

$$\text{tangent line} = y - .4 = -.3/100(x-4) = y - .4 = -.3/100x + 3/25 + .4 =$$

$$y = -.3x + .52$$

$$\text{normal line: } m = \frac{100}{3} = 33.\bar{3}$$

$$y - .4 = 100/3(x-4) = y - .4 = 100/3x - 400/3 + .4 \quad y = 33.33x - 132.93$$