

#17-23 odd, 27

Calc 6.4
Day 3

$$(17) 2x + 2y \frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = \frac{-2x}{2y} = \frac{-x}{y}$$

slope of tangent line @ (-3, 4)
 $= \frac{3}{4}$

$$y - 4 = \frac{3}{4}(x + 3)$$

$$y - 4 = \frac{3}{4}x + \frac{9}{4}$$

$$y = \frac{3}{4}x + \frac{25}{4}$$

$$(19) 2xy^2 + 2x^2y \frac{dy}{dx} = 0$$

$$\frac{dy}{dx} = \frac{-2xy^2}{2x^2y} = \frac{-y}{x}$$

slope of tangent line
@ (-1, 1) = $\frac{-1}{-1} = 1$

$$y - 1 = 1(x + 1)$$

$$y = x + 2$$

$$(21) 4y \frac{dy}{dx} - \frac{1}{2\sqrt{x}} = 0$$

$$\frac{dy}{dx} = \frac{1}{8y\sqrt{x}}$$

slope of tangent line @ (16, 2)
 $= \frac{1}{8(2)\sqrt{16}} = \frac{1}{64}$

$$y - 2 = \frac{1}{64}(x - 16)$$

$$y - 2 = \frac{1}{64}x - \frac{1}{4}$$

$$y = \frac{1}{64}x + \frac{7}{4}$$

$$\bullet \textcircled{23} e^{x^2+y^2} \left(2x + 2y \frac{dy}{dx} \right) = e^{5y} + x e^{5y} \left(5 \frac{dy}{dx} \right) - \left(2y \frac{dy}{dx} \right) (e^{2.5x}) + y e^{2.5x} (2.5)$$

$$2x e^{x^2+y^2} + 2y e^{x^2+y^2} \frac{dy}{dx} = e^{5y} + 5x e^{5y} \frac{dy}{dx} - 2y e^{2.5x} \frac{dy}{dx} - 2.5 y^2 e^{2.5x}$$

$$2y e^{x^2+y^2} - e^{5y} + 2.5 y^2 e^{2.5x} = 5x e^{5y} \left(\frac{dy}{dx} \right) - 2y e^{2.5x} \frac{dy}{dx} - 2y e^{x^2+y^2} \frac{dy}{dx}$$

$$\frac{2x e^{x^2+y^2} - e^{5y} + 2.5 y^2 e^{2.5x}}{5x e^{5y} - 2y e^{2.5x} - 2y e^{x^2+y^2}} = \frac{dy}{dx}$$

$$\text{slope @ } (2,1) = \frac{2(2)e^5 - e^5 + 2.5e^5}{10e^5 - 2e^5 - 2e^5} = \frac{5.5e^5}{6e^5} = \frac{11}{12}$$

$$y-1 = \frac{11}{12}(x-2)$$

$$y-1 = \frac{11}{12}x - \frac{11}{6}$$

$$\Rightarrow \boxed{y = \frac{11}{12}x - \frac{5}{6}}$$

$$\bullet \textcircled{27} 3y^2 \frac{dy}{dx} + y + x \frac{dy}{dx} - \frac{dy}{dx} = 32x^3 \quad \left. \begin{array}{l} y^3 + y - y = 8 \\ y^3 = 8 \\ y = 2 \end{array} \right\} (1,2)$$

$$\frac{dy}{dx} (3y^2 + x - 1) = 32x^3 - y$$

$$\frac{dy}{dx} = \frac{32x^3 - y}{3y^2 + x - 1}$$

$$\text{slope @ } (1,2) = \frac{32(1)^3 - 2}{3(4) + 1 - 1} = \frac{30}{12} = \frac{5}{2}$$

$$y-2 = \frac{5}{2}(x-1)$$

$$y-2 = \frac{5}{2}x - \frac{5}{2}$$

$$\boxed{y = \frac{5}{2}x - \frac{1}{2}}$$