p. 195

4. $y = 2\csc x + 5\cos x \qquad y' = -2\csc x \cot x - 5\sin x$

10. $y = \dfrac{1+\sin x}{x+\cos x} \qquad y' = \dfrac{(x+\cos x)(\cos x) - (1+\sin x)(1-\sin x)}{(x+\cos x)^2}$

18. $\sec x = \dfrac{1}{\cos x} \qquad \dfrac{d}{dx}(\sec x) = \dfrac{\cos x \cdot 0 - 1 \cdot (-\sin x)}{\cos^2 x}$

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

$$= \tan x \cdot \sec x$$

20. $f(x) = \cos x$

$$f'(x) = \lim_{h\to 0} \frac{\cos(x+h) - \cos x}{h} = \lim_{h\to 0} \frac{\cos(x)\cos h - \sin x \sin h - \cos x}{h}$$

$$= \lim_{h\to 0} \frac{\cos x(\cos h - 1)}{h} - \lim_{h\to 0} \frac{\sin x \sin h}{h}$$

$$= \cos x \lim_{h\to 0} \frac{\cos h - 1}{h} - \sin x \lim_{h\to 0} \frac{\sin h}{h}$$

$$= \cos x \cdot 0 - \sin x \cdot 1 \qquad = -\sin x$$

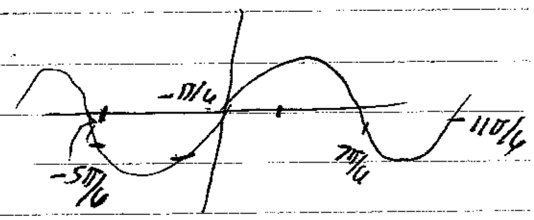
34. $y = \dfrac{\cos x}{2+\sin x}$ $\qquad y' = \dfrac{(2+\sin x)(-\sin x) - \cos x \cdot \cos x}{(2+\sin x)^2}$

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

$$= \frac{-2\sin x - 1}{(\quad)^2}$$

So Need $\quad 0 = -2\sin x - 1$

$\sin x = -1/2$



So $x = 7\pi/6$ or $11\pi/6$ + any multiples of 2π

$$\boxed{\begin{array}{l} 7\pi/6 + 2\pi k \\ 11\pi/6 + 2\pi k \quad k = \pm 0, \pm 1, \pm 2, \ldots \end{array}}$$

p203

4. $y = \tan(\sin x)$ $\quad y' = \sec^2(\sin x)\cos x$

8. $F(x) = (4x - x^2)^{100}$ $\quad F'(x) = 100(4x - x^2)(4 - 2x)$

14. $y = a^3 + \cos^3 x$ $\quad y' = -3\cos^2 x \sin x$

30. $G(y) = \left(\frac{y^2}{y+1}\right)^5$ $\quad G'(y) = 5\left(\frac{y^2}{y+1}\right)^4\left(\frac{(y+1)(2y) - y^2}{(y+1)^2}\right)$

$= 5\left(\frac{y^2}{y+1}\right)^4\left(\frac{y^2 + 2y}{(y+1)^2}\right)$

44. $y = 2^{3^{x^2}}$

$y' = 2^{3^{x^2}} \cdot \ln 2 \cdot 3^{x^2} \ln 3 \cdot 2x$

$= 2x \ln 5 \, 2^{3^{x^2}} 3^{x^2}$ $\quad$ (since $\ln 2 \ln 3 = \ln 5$)

p213

2. $4x^2 + 9y^2 = 36$ $\quad 8x + 18yy' = 0$ $\quad y' = \frac{-8x}{18y} = \boxed{\frac{-4x}{9y}}$

$y^2 = 4 - \frac{4}{9}x^2$

$y = \sqrt{4 - \frac{4}{9}x^2}$ $\quad y' = \frac{1}{2\sqrt{4 - \frac{4}{9}x^2}} \cdot -\frac{8}{9}x = \boxed{\frac{-4x}{9\sqrt{4 - 4/9x^2}}}$

THEY AGREE

6. $2\sqrt{x}+\sqrt{y}=3$

$$2\cdot\frac{1}{2\sqrt{x}}+\frac{1}{2\sqrt{y}}y'=0$$

$$\frac{1}{2\sqrt{y}}y'=\frac{-1}{\sqrt{x}}$$

$$y'=\boxed{\frac{-2\sqrt{y}}{\sqrt{x}}}$$

12. $1+x=\sin(xy^2)$

$$1=\cos(xy^2)(y^2+x\cdot 2yy')$$

$$1=y^2\cos(xy^2)+2xy\cos(xy^2)y'$$

$$\boxed{y'=\frac{1-y^2\cos(xy^2)}{2xy\cos(xy^2)}}$$

14. $y\sin(x^2)=x\sin(y^2)$

$$y'\sin(x^2)+y\cos(x^2)2x=\sin(y^2)+x\cos(y^2)\cdot 2yy'$$

$$y'\sin(x^2)-2xy\cos(y^2)y'=\sin(y^2)-2xy\cos(x^2)$$

$$y'=\frac{\sin(y^2)-2xy\cos(x^2)}{\sin(x^2)-2xy\cos(y^2)}$$