2.4B pp. 133-136 (47-65 odds, 71, 73, 77, 81)

47. $y = \cos 3x$

$\boxed{y' = -3\sin 3x}$

49. $g(x) = 3\tan 4x$

$g'(x) = 3\sec^2(4x) \cdot 4$

$\boxed{g'(x) = 12\sec^2(4x)}$

51. $y = \sin(\pi x)^2$

$y' = \cos(\pi x)^2 \cdot 2(\pi x) \cdot \pi$

$\boxed{y' = 2\pi^2 x\cos(\pi x)^2}$

53. $h(x) = \sin(2x)\cos(2x)$

$h'(x) = \sin(2x) \cdot -2\sin(2x) + \cos(2x) \cdot 2\cos(2x)$

$\boxed{h'(x) = -2\sin^2(2x) + 2\cos^2(2x)}$

$2[\cos^2(2x) - \sin^2(2x)]$

$\boxed{2\cos(4x)}$

double angle identity

ok

55. ~~$f(x) = \frac{\cot x}{\sin x} = \frac{\cos x}{\sin^2 x}$~~

~~$f'(x) = \frac{\sin^2 x \cdot -\sin x - \cos x \cdot 2\sin x \cdot \cos x}{\sin^4 x}$~~

~~$f'(x) = \frac{\sin^2 x - \sin x - 2\cos^2 x \sin x}{\sin 4x}$~~

~~$\boxed{f'(x) = \frac{\sin x - 1 - 2\cos^2 x}{\sin^3 x}}$~~

see next page for #55

57. $y = 4\sec^2 x$

$y' = 8\sec x \cdot \sec x\tan x$

$\boxed{y' = 8\sec^2 x\tan x}$

55. $f(x) = \frac{\cot x}{\sin x}$

$f'(x) = \frac{\sin x[-\csc^2 x] - \cot x[\cos x]}{\sin^2 x}$

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

$f'(x) = \frac{\frac{-1-\cos^2 x}{\sin x}}{\sin^2 x} = \boxed{\frac{-1-\cos^2 x}{\sin^3 x}}$

59. $f(\theta) = \frac{1}{4}\sin^2(2\theta)$

$f'(\theta) = \frac{1}{2}\sin(2\theta)\cos(2\theta)(2)$

$\boxed{f'(\theta) = \sin(2\theta)\cos(2\theta)}$

OK

since: $\sin(2x) = 2\sin x\cos x$

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

so: $\sin(2\theta)\cos(2\theta) =$

$\boxed{\frac{1}{2}\sin(4\theta)}$ ← OK

61. $f(t) = 3\sec^2(\pi t - 1)$

$f'(t) = 6\sec(\pi t - 1)\sec(\pi t - 1)\tan(\pi t - 1)\cdot\pi$

$\boxed{f'(t) = 6\pi\sec^2(\pi t - 1)\tan(\pi t - 1)}$

OK

OR. $f'(t) = \frac{6\pi}{\cos^2(\pi t - 1)} \cdot \frac{\sin(\pi t - 1)}{\cos(\pi t - 1)} = \boxed{\frac{6\pi\sin(\pi t - 1)}{\cos^3(\pi t - 1)}}$

63. $y = \sqrt{x} + \frac{1}{4}\sin(2x)^2 = x^{1/2} + \frac{1}{4}\sin(4x^2)$

$y' = \frac{1}{2}x^{-1/2} + \frac{1}{4}\cos(4x^2)\cdot 8x$

$\boxed{y' = \frac{1}{2\sqrt{x}} + 2x\cos(4x^2)}$

$\boxed{y = -\sin x \cos(\cos x)}$

65. $y = \sin(\cos x)$

$\boxed{y' = \cos(\cos x) \cdot -\sin x}$

71. $f(t) = \dfrac{3t+2}{t-1}$ $(0,-2)$

$f'(t) = \dfrac{(t-1)(3) - (3t+2)(1)}{(t-1)^2}$

$f'(t) = \dfrac{3t - 3 - 3t - 2}{(t-1)^2}$

$\boxed{f'(t) = \dfrac{-5}{(t-1)^2}}$

$\boxed{f'(0) = -5}$

73. $y = 37 - \sec^3(2x)$ $(0,36)$

$y' = 3\sec^2(2x)\sec(2x)\tan(2x) \cdot 2$

$\boxed{y' = 6\sec^3(2x)\tan(2x)}$

$y' = \dfrac{6}{\cos^3(2x)} \cdot \dfrac{\sin(2x)}{\cos(2x)}$

$y' = \dfrac{6\sin(2x)}{\cos^4(2x)}$

$\boxed{y'(0) = 0}$

77. $f(x) = \sin(2x)$ $(\pi, 0)$

$f'(x) = \cos(2x) \cdot 2$

$f'(x) = 2\cos(2x)$

$f'(\pi) = 2\cos(2\pi) = 2$

$\boxed{y - 0 = 2(x - \pi)}$

81. $f(x) = \sin x^2$

$f'(x) = \cos x^2 \cdot 2x$

$f'(x) = 2x \cos x^2$

$f''(x) = 2x \cdot -\sin x^2 \cdot 2x + \cos x^2 \cdot 2$

$\boxed{f''(x) = -4x^2 \sin x^2 + 2\cos x^2}$