Calc I - Hw Soln's #6 Joe Citrone

10/17/2007

p. 183-185

2. $f(x) = 3x^2 - 4x^4$

$f'(x) = 6x - 16x^3$

6. $f(x) = 8x^4 + 2x^2 - 1$

$f'(x) = 32x^3 + 4x$

11. $f(x) = x^2 \sin\frac{\pi}{3} + \tan \pi/4$

$f'(x) = 2x \sin \pi/3$

21. $f(x) = 2^3 x^3 - \frac{1}{2^3} + \frac{x}{2^3}$

$f'(x) = 24x^2 + \frac{1}{8}$

32. $f(N) = \frac{bN^2 + N}{k+b}$

$f'(N) = \frac{2bN+1}{k+b}$

42. $y = 3x^2 - 4x + 7$ at $x = 2$ $(\therefore y = 12 - 8 + 7 = 4 + 7 = 11)$

$f'(x) = 6x - 4$

$f'(2) = 12 - 4 = 8$ $\therefore y - 11 = 8(x-2)$ $\therefore \boxed{y = 8x - 5}$

46. $y = 3\pi x^5 - \frac{\pi}{2}x^3$ at $x = -1$ $(\therefore y = -3\pi + \frac{\pi}{2} = \frac{-5\pi}{2})$

$f'(x) = 15\pi x^4 - \frac{3\pi}{2}x^2$

$f'(-1) = 15\pi - \frac{3\pi}{2} = \frac{27\pi}{2}$ $\therefore y - \left(\frac{-5\pi}{2}\right) = \frac{27\pi}{2}(x+1)$

$\boxed{y = \frac{27\pi}{2}x + \frac{22\pi}{2}}$

Joe Citrano
Pg 2

HW #6 Soln's

49. $y = 4x^3 - 3x^3$ at $x = -1$ $(\therefore y = -1)$

$f'(x) = 12x^2 - 9x^2$

$f'(-1) = 12 - 9 = 3$ = slope of tangent $\Rightarrow -\frac{1}{3}$ = slope of ~~tangent~~ normal line

$\therefore y + 1 = -\frac{1}{3}(x+1)$

$\boxed{y = -\frac{1}{3}x - \frac{4}{3}}$

53. $y = \frac{x^3}{\sqrt{3}} - \sqrt{3}x^3$ at $x = 1$ $\left(\therefore y = \frac{-2\sqrt{3}}{3}\right)$

$f'(x) = \frac{3x^2}{\sqrt{3}} - 3\sqrt{3}x^2$

$f'(1) = \frac{3}{\sqrt{3}} - 3\sqrt{3} = -2\sqrt{3}$ = slope of tangent $\Rightarrow \frac{1}{2\sqrt{3}}$ = slope of normal line

$y + \frac{2\sqrt{3}}{3} = \frac{1}{2\sqrt{3}}(x-1)$

$y = \frac{1}{2\sqrt{3}}x - \frac{5\sqrt{3}}{6} = \boxed{\frac{\sqrt{3}}{6}x - \frac{5\sqrt{3}}{6}}$

73. $y = 4 - x^2 = f(x)$

$\therefore$ tangent line: $f'(x) = -2x$

since tangent lines have the same slope, need slope of tangent to equal 1

since slope of $y = x$ is 1.

$\therefore$ only pt would be $x = -\frac{1}{2}$

$\therefore y = \frac{15}{4}$

$\boxed{\left(-\frac{1}{2}, \frac{15}{4}\right)}$