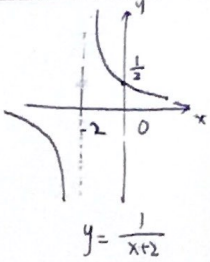
数 学 作 业 纸

（科目：Calculus）

班级：CST 01　　姓名：窦逸朗　　编号：20200106f9　　第 1 页

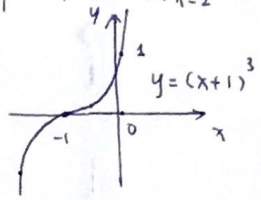
Problem A.

14. Sol. $k'(x) = \frac{1}{(x+2)^2 \cdot (x+2)'} = \frac{1}{(x+2)^2}$, the slope of $k(x)|_{x=2}$ is $\frac{1}{(2+2)^2} = \frac{1}{16}$



16. Sol. $y' = 3(x+1)^2 \cdot (x+1)' = 3(x+1)^2$

$m = y'|_{x=-2} = 3(-2+1)^2 = 3$



Problem B

1. Sol. $y' = -2x$, $y'' = -2$

3. Sol. $s' = 15t^2 - 15t^4$　　$s'' = 30t - 60t^3$

7 Sol. $w' = -6z^{-3} + z^{-2}$　　$w'' = 18z^{-4} - 2z^{-3}$

Problem C.

29. Sol. $y' = 2x^3 - 3x - 1$, $y'' = 6x^2 - 3$, $y''' = 12x$, $y^{(4)} = 12$, $y^{(n)} = 0$ $(n \geq 5)$

30. Sol. $y' = \frac{x^4}{24}$, $y'' = \frac{x^3}{6}$, $y''' = \frac{x^2}{2}$, $y^{(4)} = x$, $y^{(5)} = 1$, $y^{(n)} = 0$ $(n \geq 6)$

Problem D.

44. Sol. $y' = \frac{0 - 8 \times (x^2+4)'}{(x^2+4)^2} = \frac{-16x}{(x^2+4)^2}$, slope $m = y'|_{x=2} = \frac{-32}{(4+4)^2} = -\frac{1}{2}$

so that the tangent line of point (2,1) is $y - 1 = -\frac{1}{2}(x-2)$

Problem E.

10 Sol. a. $v(t) = s'(t) = 24 - 1.6t$ (m/s), $a(t) = v'(t) = -1.6$ (m/s²)

b. Let $v(t) = 0$, so $24 - 1.6t = 0 \Rightarrow t = 15$ s.

c. $s(15) = 24 \times 15 - 0.8 \times 15^2 = 180$ m

Problem F.

1. Sol $\frac{dy}{dx} = -10 - 3\sin x$

8. Sol $y = \cos x (1+\sin x)^{-1} = \sin x \cdot (1+\sin x)^{-1} - 1\cos x \cdot (1+\sin x)^{-2}$.

11. sol $\frac{dy}{dx} = (2x\sin x + x^2\cos x) + (2\cos x - 2x\sin x) - 2\cos x = x^2\cos x$

Problem G.

3. Sol. $g'(x) = (3x+1)' = 3$, $f'(g(x)) = \cos(3x+1)$, therefore $\frac{dy}{dx} = 3\cos(3x+1)$

4. Sol. $g'(x) = (-\frac{x}{3})' = -\frac{1}{3}$, $f'(g(x)) = -\sin(-\frac{x}{3})$, therefore $\frac{dy}{dx} = \frac{1}{3}\sin(-\frac{x}{3})$