ชื่อ-นามสกุล ....

เลขประจำตัว No. 3

แบบฝึกหัดเรื่อง อนุพันธ์

1. จงหาอนุพันธ์ของฟังก์ชันต่อไปนี้

1.1) $f(x) = \boxed{(5x+4)^7}$

$f'(x) = 7(5x+4)^6\cdot(5)$

$= 35(5x+4)^6$

1.2) $f(x) = \boxed{(2x^4+2x+7)^7}$

$f'(x) = 7(2x^4+2x+7)\cdot(8x^3+2)$

$= 7(8x^3+2)(2x^4+2x+7)$

1.3) $f(x) = \boxed{\sqrt{3-2x}}$

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

$= \frac{1}{\cancel{2}\sqrt{3-2x}}\cdot\cancel{(-2)} = \frac{-1}{\sqrt{3-2x}}$

1.4) $f(x) = \boxed{\frac{1}{5x^5+4} = (5x^5+4)^{-1}}$

$f'(x) = -1(5x^4+4)^{-2}\cdot(25x^4)$

$= -25x^4(5x^4+4)^{-2}$

$= \frac{-25x^4}{(5x^4+4)^2}$

1.5) $f(x) = \boxed{\frac{1}{(2x^2+2x+5)^7}}$

$f'(x) = -7(2x^2+2x+5)^{-8}\cdot(4x+2)$

$= \frac{-7(4x+2)}{(2x^2+2x+5)^8}$

1.6) $f(x) = \boxed{\frac{1}{\sqrt{5-4x}} = (5-4x)^{-1/2}}$

$f'(x) = -\frac{1}{\cancel{2}}(5-4x)^{-\frac{1}{2}-1}\cdot(-\cancel{4})$

$= 2(5-4x)^{-3/2}$

$= \frac{2}{(5-4x)^{3/2}}$

1.7) $f(x) = \boxed{(2x+3)^3(5x-6)}$

$f'(x) = 5(2x+3)^3 + 3(2x+3)^2\cdot(2)(5x-6)$

$= 5(2x+3)^3 + 6(5x-6)(2x+3)^2$

1.8) $f(x) = \boxed{\frac{(2x+3)^3}{(5x-6)^3}}$

$f'(x) = \frac{3(2x+3)^2\cdot(2)(5x-6)^3 - 3(5x-6)^2(5)(2x+3)^3}{((5x-6)^3)^2}$

$= \frac{(5x-6)^2\left[6(2x+3)^2\cdot(5x-6) - 15(2x+3)^3\right]}{(5x-6)^{\cancel{6}\,4}}$

$= \frac{(2x+3)^2\left[6(5x-6) - 15(2x+3)\right]}{(5x-6)^4} = \frac{-81(2x+3)^2}{(5x-6)^4}$

2. กำหนดข้อมูลตามตารางด้านล่าง จงหา $F'(\boxed{k=2})$ เมื่อ

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
−6	3	−4	−3	16
−5	4	−3	−4	14
−4	5	−2	−5	12
−3	6	−1	−6	10
−2	7	0	7	8
−1	−6	1	6	6
0	−5	2	5	4

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
1	−4	3	4	2
2	−3	4	3	0
3	−2	5	2	−2
4	−1	6	1	−4
5	0	7	0	−6
6	1	8	−1	−8
7	2	9	−2	−10

2.1) $F(x) = f(g(x))$

$F'(k) = f'(g(k))\cdot g'(k)$

$F'(2) = f'(g(2))\cdot g'(2)$

$= f'(3)\cdot(0) = 5(0)$

$F'(2) = \boxed{0}$

2.2) $F(x) = g(f(x))$

$F'(k) = g'(f(k))\cdot f'(k)$

$F'(2) = g'(f(2))\cdot f'(2)$

$= g'(-3)(4) = 10(4)$

$F'(2) = \boxed{40}$

3. กำหนดข้อมูลตามตารางด้านล่าง และ $F(x) = f(g(x))$ จงหา $F'(\boxed{k=3})$ เมื่อ

x	−8	−7	−6	−5	−4	−3	−2	−1	0
$g(x)$	−5	−4	−3	−2	−1	0	1	2	3
$g'(x)$	−7	−6	−5	−4	−3	−2	−1	0	1

x	1	2	3	4	5	6	7	8	9
$g(x)$	4	5	6	7	8	9	−8	−7	−6
$g'(x)$	2	3	4	5	6	7	8	9	10

3.1) $f(x) = x\cdot g(x)$

$F'(k) = f'(g(k)) = (g(k)\cdot g(g(k)))'$

$= g(k)(g(g(k)))' + g'(k)\cdot g(g(k))$

$F'(k) = g(k)\cdot g'(g(k))\cdot g'(k) + g'(k)\cdot g(g(k))$

$F'(3) = g(3)\cdot g'(g(3))\cdot g'(3) + g'(3)\cdot g(g(3))$

$= 6(7)(4) + (4)(9) = \boxed{204}$

3.2) $f(x) = \frac{g(x)}{x}$

$F'(k) = f'(g(k)) = \left(\frac{g(g(k))}{g(k)}\right)'$

$F'(k) = \frac{g'(g(k))\cdot g'(k)\cdot g(k) - g(g(k))\cdot g'(k)}{(g(k))^2}$

$F'(3) = \frac{g'(g(3))\cdot g'(3)\cdot g(3) - g(g(3))\cdot g'(3)}{(g(3))^2} = \frac{7(4)(6) - 9(4)}{36} = \boxed{\frac{11}{3}}$

4. กำหนด $x(t) = \boxed{\frac{4t^2}{5+t^2}}$, $P(x) = \boxed{8\sqrt{x} - 9}$ $k = \boxed{6}$ จงหา

4.1) $\frac{dx}{dt} = \frac{(4t^2)'(5+t^2) - 4t^2(5+t^2)'}{(5+t^2)^2}$

$= \frac{8t(5+t^2) - 4t^2(2t)}{(5+t^2)^2}$

$\frac{dx}{dt} = \boxed{\frac{40t}{(5+t^2)^2}}$

4.2) $\frac{dP}{dx} = 8\left(\frac{1}{2}x^{\frac{1}{2}-1}\right)$

$= 4x^{-1/2}$

$\frac{dP}{dx} = \boxed{\frac{4}{\sqrt{x}}}$

4.3) $\left.\frac{dP}{dt}\right|_{t=k} = \left.\frac{dP}{dx}\cdot\frac{dx}{dt}\right|_{t=6}$

$= \frac{4}{\sqrt{x}}\cdot\frac{40t}{(5+t^2)^2} = \frac{160t}{\sqrt{x}(5+t^2)^2}$

$= \frac{160(6)}{\sqrt{\frac{4t^2}{5+t^2}}\cdot(5+6^2)^2} = \frac{160(6)}{\sqrt{\frac{4(6)^2}{5+36}}\cdot(41)^2}$

$= \frac{\cancel{960}^{80}\cancel{(41)}}{\cancel{12}\sqrt{41}(41)^{\cancel{2}}} = \frac{80}{41\sqrt{41}} = \boxed{0.305}$

Diff03 for No.3

$$No01 = \begin{bmatrix} .1 = (f(x) = (5x+4)^7) & .2 = (f(x) = (2x^4+2x+7)^7) \\ .3 = (f(x) = \sqrt{3-2x}) & .4 = \left(f(x) = \frac{1}{5x^5+4}\right) \\ .5 = \left(f(x) = \frac{1}{(2x^2+2x+5)^7}\right) & .6 = \left(f(x) = \frac{1}{\sqrt{5-4x}}\right) \\ .7 = (f(x) = (2x+3)^3(5x-6)) & .8 = \left(f(x) = \frac{(2x+3)^3}{(5x-6)^3}\right) \end{bmatrix}$$

No2 : k = 2

x	f(x)	f'(x)	g(x)	g'(x)
-6	3	-4	-3	16
-5	4	-3	-4	14
-4	5	-2	-5	12
-3	6	-1	-6	10
-2	7	0	7	8
-1	-6	1	6	6
0	-5	2	5	4

x	f(x)	f'(x)	g(x)	g'(x)
1	-4	3	4	2
2	-3	4	3	0
3	-2	5	2	-2
4	-1	6	1	-4
5	0	7	0	-6
6	1	8	-1	-8
7	2	9	-2	-10

No3 : k = 3

x	-8	-7	-6	-5	-4	-3	-2	-1	0
g(x)	-5	-4	-3	-2	-1	0	1	2	3
g'(x)	-7	-6	-5	-4	-3	-2	-1	0	1

x	1	2	3	4	5	6	7	8	9
g(x)	4	5	6	7	8	9	-8	-7	-6
g'(x)	2	3	4	5	6	7	8	9	10

$$No04 = \left[x(t) = \frac{4t^2}{5+t^2}, P(x) = 8\sqrt{x} - 9, k = 6 \right]$$

Diff03 Answers for No.3

$$Ans1 = \begin{bmatrix} .1 = (f'(x) = 35\,(5\,x+4)^6) & .2 = (f'(x) = 7\,(2\,x^4+2\,x+7)^6\,(8\,x^3+2)) \\ .3 = \left(f'(x) = -\dfrac{1}{\sqrt{3-2\,x}}\right) & .4 = \left(f'(x) = -\dfrac{25\,x^4}{(5\,x^5+4)^2}\right) \\ .5 = \left(f'(x) = -\dfrac{7\,(4\,x+2)}{(2\,x^2+2\,x+5)^8}\right) & .6 = \left(f'(x) = \dfrac{2}{(5-4\,x)^{(3/2)}}\right) \\ .7 = (f'(x) = 6\,(2\,x+3)^2\,(5\,x-6)+5\,(2\,x+3)^3) & .8 = \left(f'(x) = -\dfrac{81\,(2\,x+3)^2}{(5\,x-6)^4}\right) \end{bmatrix}$$

$$Ans2 = \begin{bmatrix} .1 = [F'(k) = 0] \\ .2 = [F'(k) = 40] \end{bmatrix},\ Ans3 = \begin{bmatrix} .1 = [F'(k) = 204] \\ .2 = \left[F'(k) = \dfrac{11}{3}\right] \end{bmatrix},\ Ans4 = \begin{bmatrix} .1 = \left[\dfrac{dx}{dt} = \dfrac{40\,t}{(5+t^2)^2}\right] \\ .2 = \left[\dfrac{dP}{dx} = \dfrac{4}{\sqrt{x}}\right] \\ .3 = \left[\dfrac{80\,\sqrt{41}}{1681},\ 0.305\right] \end{bmatrix},\ ,\ \begin{bmatrix} M \\ a \\ t \\ h \\ @ \\ M \\ U \\ T \end{bmatrix}$$

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