1) $f(x) = \dfrac{1}{8\cdot(4-3x)^2} + 2x^2$ $\rightarrow P_4(x;1)$

$\rightarrow R_4(1\tfrac{2}{3};1)$

2) $f(x) = 4\cdot\sin\left(\frac{\pi}{2}\cdot x\right) + 3x^2$; $P_3(x;2)$ $\wedge$ $R_3(2{,}5;2)$

n	$f^{(n)}(x)$	$f^{(n)}(1)$	$(x-1)^n$	$n!$
0	$\frac{1}{8}(4-3x)^{-2} + 2x^2$	$2\frac{1}{8}$	1	1
1	$\frac{3}{4}(4-3x)^{-3} + 4x$	$4\frac{3}{4}$	$x-1$	1
2	$\frac{27}{4}(4-3x)^{-4} + 4$	$10\frac{3}{4}$	$(x-1)^2$	2
3	$81(4-3x)^{-5}$	81	$(x-1)^3$	6
4	$1215(4-3x)^{-6}$	1215	$(x-1)^4$	24
5	$10\cdot3^7(4-3x)^{-7}$		$(x-1)^5$	120

$3^4\cdot3\cdot5$

$3^5\cdot5\cdot18$

$10\cdot3^7$

a) $P_4(x,1) = 2\frac{1}{8} + 4\frac{3}{4}\cdot(x-1) + 5\frac{3}{8}(x-1)^2 + \frac{27}{7}(x-1)^3$

$$+ \frac{1215}{24}\cdot(x-1)^4$$

5) $R_4(1\frac{2}{3};1) = 10\cdot 3^7 \cdot \frac{1}{\left[4-3\cdot\left(1+\vartheta\left(1\frac{2}{3}-1\right)\right)\right]^7}\cdot\frac{\left(1\frac{2}{3}-1\right)^5}{120}$

$x_0+\vartheta(x-x_0)$

$$= \frac{\cancel{10}\cdot \overset{3^2}{\cancel{3^7}}\cdot\frac{2^5}{\cancel{3^5}}}{\underset{3\cdot 2^2}{\cancel{120}}}\cdot\frac{1}{[\sim]^7}$$

$$3\cdot 2^3 \quad \frac{1}{\left[4-3\cdot\left(1+\vartheta\cdot\frac{2}{3}\right)\right]^7}$$

$\hookrightarrow 4-3-\vartheta\cdot 3\cdot\frac{2}{3}$

$$24\cdot\frac{1}{[1-2\vartheta]^7}$$

$$f(x) = 4 \cdot \sin\left(\frac{\pi}{2} \cdot x\right) + 3x^2$$

$$\rightarrow P_3(x;2) \wedge R_3(1{,}5;2)$$

n	$f^n(x)$	$f^n(2)$	$(x-2)^n$	$n!$
0	$4 \cdot \sin(\frac{\pi}{2}x) + 3x^2$	12	1	1
1	$2\pi \cdot \cos(\frac{\pi}{2}x) + 6x$	$-2\pi + 12$	$x-2$	1
2	$-\pi^2 \sin(\frac{\pi}{2}x) + 6$	6	$(x-2)^2$	2
3	$-\pi^3/2 \cos(\frac{\pi}{2}x)$	$\pi^3/2$	$(x-2)^3$	6
4	$\pi^4/4 \sin(\frac{\pi}{2}x)$		$(x-2)^4$	24

$$P_3(x,2) = 12 + (12-2\pi)\cdot(x-2) + 3(x-2)^2 + \frac{\pi^3}{12}(x-2)^3$$

$(x_0 + \vartheta(x - x_0))$ $\quad (x - x_0)^4$

$$R_3(1{,}5;2) = \frac{\pi}{4}^4 \cdot \frac{\sin\left[\frac{\pi}{2}\cdot(2+\vartheta(1{,}5-2))\right]\cdot(1{,}5-2)^4}{24}$$

$4!$

$$= \pi^4 \cdot \underbrace{\frac{1}{4}\cdot\frac{1}{24}\cdot\frac{1}{2^4}}_{} \cdot \sin\left[\pi + \frac{\pi}{2}\cdot\left(-\frac{1}{2}\vartheta\right)\right]$$

$$= \pi^4 \frac{1}{1536} \cdot$$

$\vartheta = 0$ $\quad \sin(\pi) = 0$

$\vartheta = 1$ $\quad \sin(3/4\,\pi) =$

$$\sin\left(\pi - \frac{1}{4}\pi\vartheta\right) = \underbrace{\underbrace{\sin(\pi)}_{0}\cdot\cos(1/4\,\pi\vartheta)}_{0} - \underbrace{\cos(\pi)\cdot\sin(1/4\,\pi\vartheta)}_{\sin(1/4\,\pi\vartheta)}$$

$\sin(0)$ $\quad \sin(1/4\,\pi)$