- Дополнить отчёт

№ 13 82

$f(x) = 2^x$; $x_0 = \log_2 3$

1) $f(x_0) = 2^{\log_2 3} = 3$;

2) $f'(x) = 2$;

$f'(x_0) = 2$;

3) $f''(x) = 0$; $\Rightarrow$ ост. член не требуется

4) $f(x_0) = 3 + \frac{2}{1}(x - \log_2 3) + \frac{2}{2}(x - \log_2 3)^2 =$

$$= (x - \log_2 3)^2 + 2(x - \log_2 3) + 3$$

№ 7.3.33

$f(x) = \frac{x^2 \ln x}{2}$, $x_0 = 1$

1) $f(x_0) = \frac{1 \cdot 0}{2} = 0$

2) $f'(x) = \frac{(x^2 \ln x)' \cdot 2 - (x^2 \ln x) \cdot 0}{4} =$

$= \frac{(2x \cdot \ln x + x) \cdot 2}{4} = \frac{x(2\ln x + 1)}{2}$

$f'(x_0) = \frac{1 \cdot (2 \cdot 0 + 1)}{2} = \frac{1}{2}$

3) $f''(x) = \frac{(x(2\ln x + 1))' \cdot 2 - 0}{4} =$

$= \frac{(2\ln x + 1) + x \cdot (\frac{2}{x} + 1)}{2} = \frac{2\ln x + 1 + 2 + x}{2} =$

$= \frac{2\ln x + 3 + x}{2}$

$f''(x_0) = \frac{0 + 3 + 1}{2} = 2$

4) $f'''(x) = \frac{(2\ln x + 3 + x)' \cdot 2 - 0}{4} = \frac{(\frac{2}{x} + 1)}{2}$

$f'''(x_0) = \frac{(\frac{2}{1} + 1)}{2} = \frac{3}{2}$

5) $f^{(4)}(x) = \left(\frac{2}{2x} + \frac{1}{2}\right)' =$

$= \frac{0 - 2 \cdot (2x)'}{(2x)^2} = -\frac{4}{4x^2} = -\frac{1}{x^2}$

$f^{(4)}(x_0) = -1$

6) $f^{(5)}(x) = \left(-\frac{1}{x^2}\right)' = \frac{0 + 2x}{x^4} = \frac{2}{x^3}$

$f^{(5)}(x_0) = 2;$

7) $f^{(6)}(x) = \left(\frac{2}{x^3}\right)' = \frac{0 - 2 \cdot 3x^2}{x^6} = \frac{-6}{x^4}$

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

$f(x_0) = \frac{1}{2 \cdot 1}(x-1) + \frac{2}{2}(x-1)^2 + \frac{3}{2 \cdot 6}(x-1)^3 + \ldots +$

$+ \frac{(-1)^{n+1} \cdot (n-3)!}{x^{n-2} \cdot n!} \cdot (x-1)^n + o((x-1)^n)$

№ 7.33.4

$f(x) = e^{2-x}$, до x^4

1) $f(x_0) = e^2$,

2) $f'(x) = (e^{2-x})'(2-x)' = -e^{2-x}$

$f'(x_0) = -e^2$

3) $f''(x) = (-e^{2-x})'(2-x)' = e^{2-x}$

$f''(x_0) = e^2$

4) $f'''(x) = (e^{2-x})'(2-x)' = -e^{2-x}$

$f'''(x_0) = -e^2$

5) $f^{(4)}(x) = (-e^{2-x})'(2-x)' = e^{2-x}$

$f^{(4)}(x_0) = e^2$

6) $f(x) = e^2 + \frac{-e^2}{1}x + \frac{e^2}{2}x^2 + \frac{-e^2}{6}x^3 + \frac{e^2}{24}x^4$

$+ o(x^4) = \frac{e^2}{24}x^4 - \frac{e^2}{6}x^3 + \frac{e^2}{2}x^2 - \frac{e^2}{1}x + e^2 + o(x^4)$

№ 7.33.5

$f(x) = \arcsin x$, до x^3

1) $f(x_0) = 0$

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

$f'(x_0) = \frac{1}{1} = 1$

3) $f''(x) = \frac{0 - (\sqrt{1-x^2})'}{1-x^2} = \frac{x}{\sqrt{1-x^2}} \cdot \frac{1}{1-x^2} = \frac{x}{(\sqrt{1-x^2})^3}$

$f''(x_0) = \frac{0}{(\sqrt{1-0})^3} = \frac{0}{1} = 0$

4) $f'''(x) = \frac{(\sqrt{1-x^2})^3 - x((\sqrt{1-x^2})^3)'}{(\sqrt{1-x^2})^6} = \frac{(\sqrt{1-x^2})^3 + 3x^2\sqrt{1-x^2}}{\sqrt{1-x^2}^6}$

$f'''(x_0) = \frac{1+0}{1} = 1$

$f(x_0) = \frac{1}{1}x + 0 + \frac{1}{6}x^3 + o(x^3) = \frac{1}{6}x^3 + x + o(x^3)$