Самостоятельная работа. Фролов А.А

$$\sin(x) = \sum_{k=0}^{\infty} (-1)^k \frac{x^{2k+1}}{(2k+1)!}$$

$$u(k-1) = (-1)^{(k-1)} \frac{x^{2(k-1)+1}}{(2(k-1)+1)!}$$

$$2k-2+1 = 2k-1!$$

$$u = \frac{u_k}{u(k-1)} = \frac{(-1)^k \cdot x^{2k+1}}{(2k+1)!} : \frac{(2(k-1)+1)!}{(-1)^{(k-1)} \, x^{2(k-1)+1=2k-2+1}}$$

$$(-1)^k = (-1)^{(k-1)} \cdot (-1)$$

$$2k+1 = 2(k-1)+1+2 \Rightarrow$$

$$\Rightarrow x^{2k+1} = x^{2(k-1)+1+2}$$

$$x^{2k+1} = x^{2(k-1)+1} \cdot x^2$$

$$(2k+1)! = (2k+1) \cdot 2k \cdot (2k-1) \cdot \ldots \Rightarrow$$

$$(2k+1)! = (2k+1) \cdot 2k \, (2k-1)!$$

$$u = \frac{\cancel{(-1)^{(k-1)}} \cdot (-1) \cdot \cancel{x^{2(k-1)+1}} \cdot x^2 \cdot \cancel{(2k-1)!}}{(2k+1) \cdot 2k \cdot \cancel{(2k-1)!} \cdot \cancel{(-1)^{k-1}} \cdot \cancel{x^{2(k-1)+1}}} =$$

$$= \frac{-x^2}{(2k+1) \cdot 2k} = \frac{-x^2}{4k^2+2k} = \frac{-x^2}{2k(2k+1)}$$

$$\cos(x) \approx \sum_{k=0}^{\infty} (-1)^k \frac{x^{2k}}{(2k)!}$$

$$U_{k-1} = (-1)^{(k-1)} \frac{x^{2(k-1)}}{(2(k-1))!} = \frac{(-1)^{(k-1)} x^{2k-2}}{(2k-2)! \cdot x^2}$$

$$U_k = \frac{(-1)^k x^{2k}}{(2k)!} = \frac{(-1)^{(k-1)} \cdot (-1) \cdot x^{2k}}{2k \cdot (2k-1) \cdot (2k-2)!}$$

$$U = \frac{\cancel{(-1)^{k-1}} \cdot (-1) \cdot \cancel{x^{2k}}}{2k(2k-1)\cancel{(2k-2)!}} \cdot \frac{\cancel{(2k-2)!} \cdot x^2}{\cancel{(-1)^{(k-1)}} \cdot \cancel{x^{2k}}}$$

$$= \frac{-1 \cdot x^2}{2k(2k-1)} = \frac{-x^2}{2k(2k-1)}$$