f - ma biegun rzędu 1 w a $\Rightarrow$ $\operatorname{res}(f;a) = \lim\limits_{z\to a} f(z)(z-a)$

- | | — $\leq m$ w a $\Rightarrow$ $\operatorname{res}(f;a) = \lim\limits_{z\to a}\left[\frac{1}{(m-1)!}\cdot g^{(m-1)}(z)\right]$, $g(z) = (z-a)^m f(z)$

$z \in D'(a,r)$

$$f(z) = \sum_{n=-m}^{\infty} c_n (z-a)^n$$

82 $f_1(z) = \frac{1}{z^3 - z^5}$ $\qquad z^3 - z^5 = z^3(1-z)(1+z)$

z 77 f_1 ma bieguny w $0, 1, -1$ rzędu $3, 1, 1$ (odpowiednio)

$$\operatorname{Res}(f_1, 1) = \lim_{z\to 1} \frac{1}{z^3\cancel{(1-z)}(1+z)} \cdot \cancel{(z-1)}^{-1} = \frac{-1}{1\cdot 2} = -\frac{1}{2}$$

$$\operatorname{Res}(f_1, -1) = \lim_{z\to -1} \frac{1}{z^3(1-z)\cancel{(1+z)}} \cdot \cancel{(1+z)} = \frac{1}{-2}$$

$$\operatorname{Res}(f_1, 0) = \lim_{z\to 0} \frac{1}{2!} g^{(2)}(z) = \frac{1}{2!} \cdot \frac{2}{1}$$

$$g(z) = \cancel{z^3} \frac{1}{\cancel{z^3}(1-z^2)} = \frac{1}{1-z^2}$$

$$g'(z) = \frac{+2z}{(1-z^2)^2} \qquad g^{(2)}(z) = -\frac{-2(1-z^2)^2 + 2z\cdot 2(1-z^2)\cdot -2z}{(1-z^2)^4} =$$

$$= \frac{\qquad}{\qquad}$$