# Осипов Никита, ПМ-1801

# (1.3.6) Паде - аппроксимация [n/n+2]

```
[n / n + 2]
Матрица для нахождения коэффициентов bi при [n / n + 2];
      {{C-1,  C0,  C1,  ........,  Cn},
 l  =  {C0, C1, ..........., Cn+1},
        .......................,
       {Cn,  Cn+1,  ........, Cn+n+1}}
```

$$\begin{bmatrix} c_{m-n+1} & c_{m-n+2} & \cdots & c_{m-1} & c_m \\ c_{m-n+2} & & \iddots & \iddots & c_{m+1} \\ \vdots & \iddots & \iddots & \iddots & \vdots \\ c_{m-1} & \iddots & \iddots & & c_{m+n-2} \\ c_m & c_{m+1} & \cdots & c_{m+n-2} & c_{m+n-1} \end{bmatrix} \begin{bmatrix} b_n \\ b_{n-1} \\ \vdots \\ b_2 \\ b_1 \end{bmatrix} = - \begin{bmatrix} c_{m+1} \\ c_{m+2} \\ \vdots \\ c_{m+n-1} \\ c_{m+n} \end{bmatrix}$$

In[1]:=
```
Clear@x;
f1 = Sqrt[(1 + x/2)/(1 + 2 x)];
f2 = Sin[x];
```

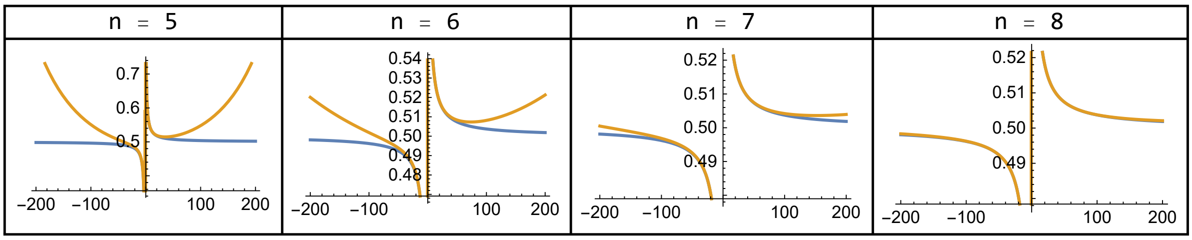
taylor - Функция для нахождения коэффициентов ряда Тейлора;

```
Clear@x;
taylor[f_, n_] := Module[{r, test = {}, z},
   z = Table[Clear@x;
     r = D[f, {x, t}]/t!;
     x = 0;
     AppendTo[test, r] , {t, 0, n}];
   z[[-1]]];
```

apPade - Паде - аппроксимация.

```
apPade[f_, n_] := Module[{l = {}, c, r, b, a, sta = 0, stb = 0},
   Clear@x;
   c = taylor[f, 2 * n + 3];
   AppendTo[l, Flatten@{0, c[[#]] & /@ Range[n + 1]}];
   (*{C-1, C0, C1, ......., Cn}*)
   For[i = 1, i ≤ n + 1, i++,
    AppendTo[l, c[[#]] & /@ Range[i, n + 1 + i]]]; (*Заполнение матрицы l*)
   r = -(c[[#]] & /@ Range[n + 2, 2 * n + 3]);
   (*Результат произведение матрицы l на {b1, ..., bj}*)
   b = N@# & /@ (Flatten[{1, Reverse[Inverse[l].r]}]);
   a = {c[[1]]};
   For[L = 2, L ≤ n + 1, L++,
    AppendTo[a, c[[L]] + Sum[b[[k]] * c[[L - k + 1]], {k, 2, L}]]];
   a = N@# & /@ a;
   Clear@x;
   a = Normal@Plus @@ (# * x^sta++ & /@ a); (*a0+a1x+a2x^2+..+anx^n*)
   b = Normal@Plus @@ (# * x^stb++ & /@ b); (*b0+b1x+b2x^2+..+bn+2x^(n+2)*)
   a/b];
```

Out[24]= $\sqrt{\dfrac{1+\frac{x}{2}}{1+2x}}$




Out[16]= Sin[x]