```
> restart;
> An:=1/(4*n+1)+1/(4*n+3)-1/(2*n+2);
```

$$An := \frac{1}{4n+1} + \frac{1}{4n+3} - \frac{1}{2n+2} \tag{1}$$

```
> Bn:=1/2^(4*n)+1/2^(4*n+2)-1/2^(2*n+1);
```

$$Bn := \frac{1}{2^{4n}} + \frac{1}{2^{4n+2}} - \frac{1}{2^{2n+1}} \tag{2}$$

```
> S5:=sum(An,n=0..5);
```

$$S5 := \frac{535076383}{535422888} \tag{3}$$

```
> evalf(S5-3/2*ln(2));
```

$$-0.0403679324 \tag{4}$$

```
> S10:=sum(An,n=0..10);
```

$$S10 := \frac{4791653106510750947}{4709794079401210800} \tag{5}$$

```
> evalf(S10-3/2*ln(2));
```

$$-0.022340175 \tag{6}$$

```
> S20:=sum(An,n=0..20);
```

$$S20 := \frac{4150766071496147766597196307019030011}{4038015477221850872497035152050984800} \tag{7}$$

```
> evalf(S20-3/2*ln(2));
```

$$-0.011798492 \tag{8}$$

```
> S200:=sum(An,n=0..200);
```

$$S200 := \tag{9}$$

$$\begin{aligned}
&98448361952234103427064322793623381913691387208583195345534425994871300742\backslash\\
&22383881652551507456926893608863463999800102551720221064918732248306069245\backslash\\
&88569777137960886935631905100413406226122051113566750670115183348842038676\backslash\\
&76176999584154711247720367856495536463568062221431950000686077334625761173\backslash\\
&69896931598997474694289545453733088590948636836\Big/\\
&94800609866983704353976341313371405878545494991151610178691060115374723804\backslash\\
&75900272969198473473982327219024659676560920863062217639423024253816234258\backslash\\
&11812442096240700444871714627913598354044696929457159279560915702227702657\backslash\\
&66945235649719258581846621263032196871566287090994537616832621498803018659\backslash\\
&31279773773458246429162364752897871781617584000
\end{aligned}$$

```
> evalf(S200-3/2*ln(2));
```

$$-0.001242621 \tag{10}$$

```
> S2000:=sum(An,n=0..2000):
> evalf(S2000-3/2*ln(2));
```

$$-0.000124925 \tag{11}$$

```
> an:=(-1)^(n+1)*1/n;
```

$$an := \frac{(-1)^{n+1}}{n} \tag{12}$$

```
> s10:=sum(an,n=1..10);
```

(13)

$$s10 := \frac{1627}{2520} \quad (13)$$

```
> evalf(s10-ln(2));
```

$$-0.0475122600 \quad (14)$$

```
> s100:=sum(an,n=1..100);
```

$$s100 := \frac{47979622564155786918478609039662898122617}{69720375229712477164533808935312303556800} \quad (15)$$

```
> evalf(s100-ln(2));
```

$$-0.0049750013 \quad (16)$$

```
> s2000:=sum(an,n=1..2000):
> evalf(s2000-ln(2));
```

$$-0.0002499375 \quad (17)$$

```
> evalf(2/3);
```

$$0.6666666667 \quad (18)$$

```
> T5:=sum(Bn,n=0..5);
```

$$T5 := \frac{2796885}{4194304} \quad (19)$$

```
> evalf(T5);
```

$$0.6668293476 \quad (20)$$

```
> T100:=sum(Bn,n=0..100);
```

$$T100 := \quad (21)$$

$$688599967489842290574911779200803166487921544754459603421509268873375649803842688032044916952210256529773764712255018325310328999512347634358623676688012047497318823171316894051322637426162590488067364778518581413120551325743612687890989973504$$

```
> evalf(T100);
```

$$0.6666666667 \quad (22)$$

```
> Bn;
```

$$\frac{1}{2^{4n}} + \frac{1}{2^{4n+2}} - \frac{1}{2^{2n+1}} \quad (23)$$

```
> bn:=(-1)^n/2^n;
```

$$bn := \frac{(-1)^n}{2^n} \quad (24)$$

```
> t5:=sum(bn,n=0..5);
```

$$t5 := \frac{21}{32} \quad (25)$$

```
> evalf(t5);
```

$$0.6562500000 \quad (26)$$

```
> t10:=sum(bn,n=0..10);
```

$$t10 := \frac{683}{1024} \quad (27)$$

```
> evalf(t10);
```

$$0.6669921875 \quad (28)$$

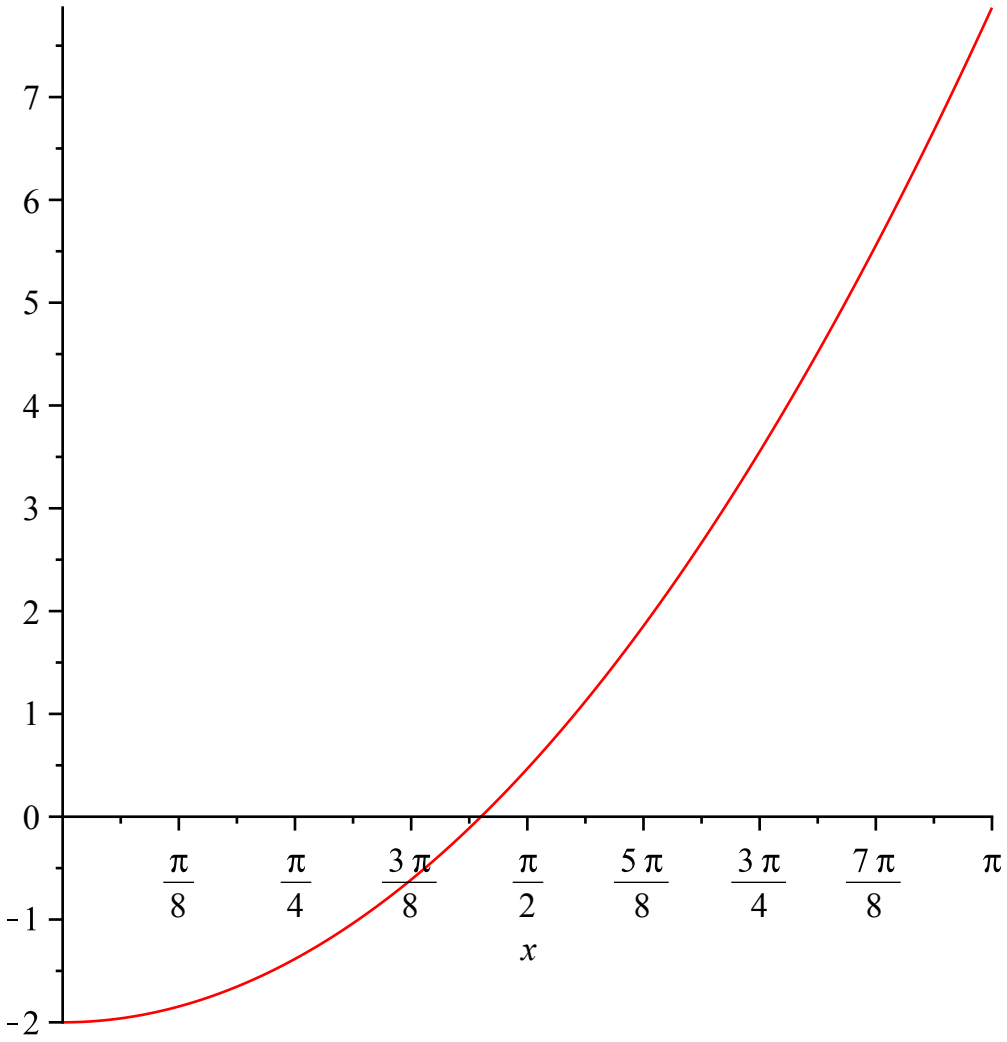
```
> t1000:=sum(bn,n=0..1000):
```

```
> evalf(t1000);
```

$$0.6666666667 \tag{29}$$

```
> f:=x^2-2;
> plot(f,x=0..Pi);
> df:=diff(f,x);
> phi:=unapply(x-f/df,x);
```

$$f := x^2 - 2$$



$$df := 2\,x$$

$$\phi := x \to x - \frac{1}{2}\,\frac{x^2 - 2}{x} \tag{30}$$

```
> x1:=3/2;
```

$$x1 := \frac{3}{2} \tag{31}$$

```
> x2:=phi(x1);
```

$$x2 := \frac{17}{12} \tag{32}$$

```
> x3:=phi(x2);
```

$$x3 := \frac{577}{408} \tag{33}$$

```
> x4:=phi(x3);
```

$$x4 := \frac{665857}{470832} \quad \textbf{(34)}$$

```
> evalf(sqrt(2));
```

$$1.414213562 \quad \textbf{(35)}$$

```
> evalf(x4);
```

$$1.414213562 \quad \textbf{(36)}$$

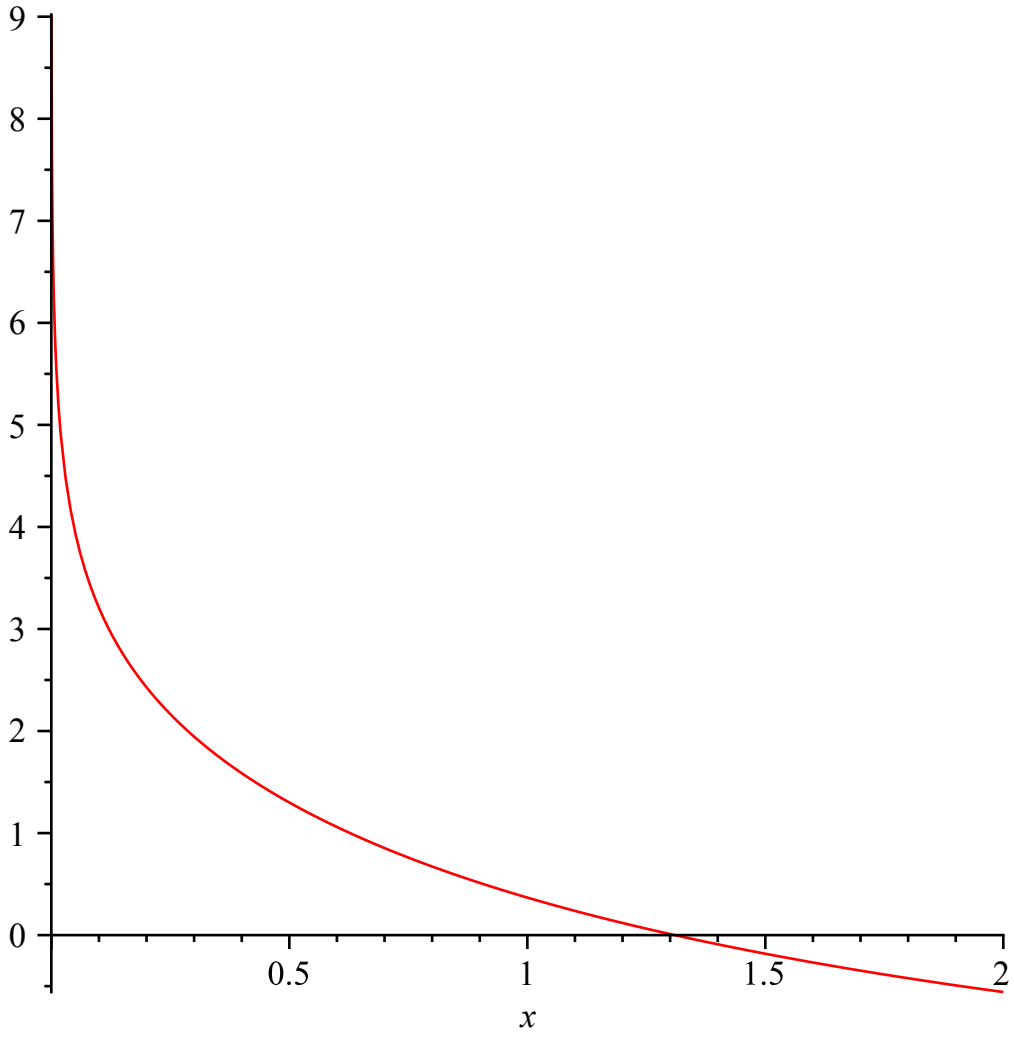
```
> Digits:=40;
```

$$Digits := 40 \quad \textbf{(37)}$$

```
> f:=exp(-x)-ln(x);
```

$$f := e^{-x} - \ln(x) \quad \textbf{(38)}$$

```
> plot(f,x=0..2);
```




```
> x1:=1.5;
```

$$x1 := 1.5 \quad \textbf{(39)}$$

```
> df:=diff(f,x);
```

$$df := -e^{-x} - \frac{1}{x} \quad \textbf{(40)}$$

```
> phi:=unapply(x-f/df,x);
```

$$\phi := x \to x - \frac{e^{-x} - \ln(x)}{-e^{-x} - \frac{1}{x}} \quad (41)$$

```
> x2:=phi(x1);
```

$$x2 := 1.295082492469233632926749502495377748894 \quad (42)$$

```
> x3:=phi(x2);
```

$$x3 := 1.309710106271538486127944875928601219174 \quad (43)$$

```
> x4:=phi(x3);
```

$$x4 := 1.309799582500419182491954050880460140357 \quad (44)$$

```
> x5:=phi(x4);
```

$$x5 := 1.309799585804150473165594724994543756024 \quad (45)$$

```
> x6:=phi(x5);
```

$$x6 := 1.309799585804150477669233701968172497642 \quad (46)$$

```
> x7:=phi(x6);
```

$$x7 := 1.309799585804150477669233701968172506011 \quad (47)$$

```
> x8:=phi(x7);
```

$$x8 := 1.309799585804150477669233701968172506011 \quad (48)$$