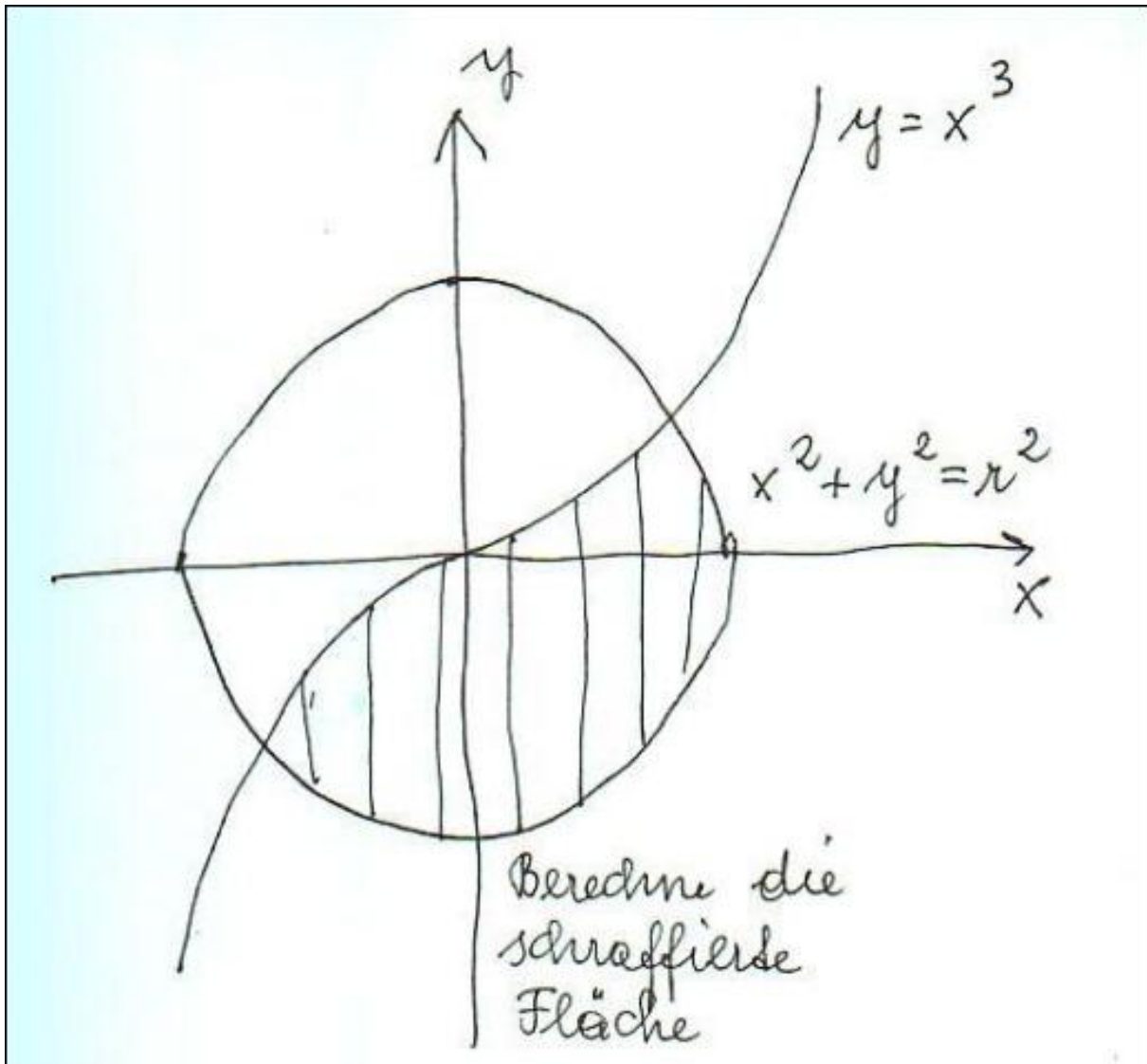


Flächenintegral

Dokumentnummer: DX1093

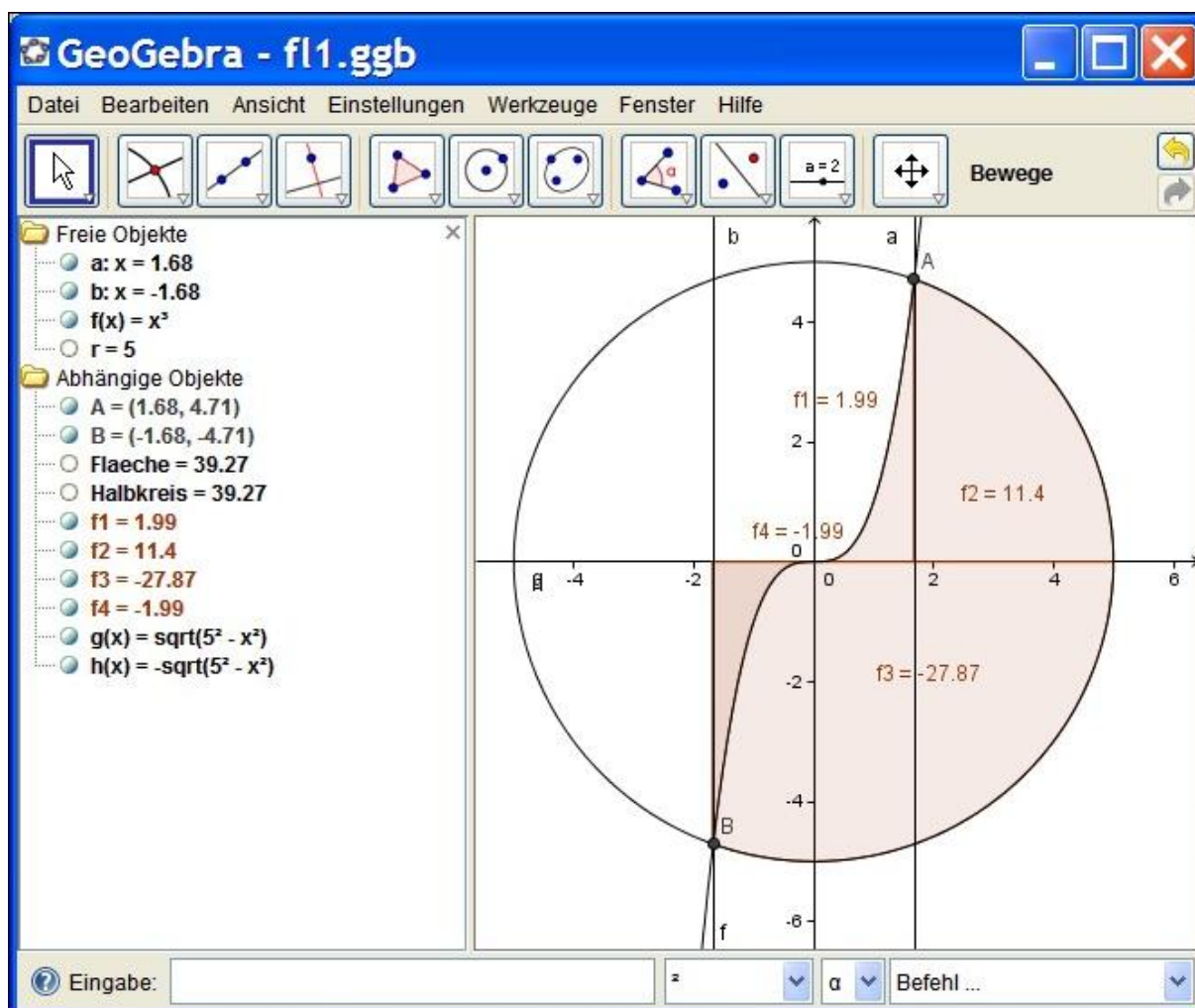
Fachgebiet: Kreis, kubische Parabel, bestimmtes Integral

Problembeschreibung



Problemlösung

LÖSUNG MIT GEOGEBRA



LÖSUNG MIT WX-MAXIMA

```
>> kill(all);r:5;
```

```
(%o0) done
```

```
(%o1) 5
```

```
>> f(x):=x**3;g(x):=sqrt(r**2-x**2);h(x):=-g(x);
```

```
(%o2) f(x) := x3
```

```
(%o3) g(x) :=  $\sqrt{r^2 - x^2}$ 
```

```
(%o4) h(x) := -g(x)
```

Flächenintegral

```
>> kreis:x**2+y**2=r**2;kubische_parabel:y=x**3;
```

```
(%o5)  $y^2 + x^2 = 25$ 
```

```
(%o6)  $y = x^3$ 
```

BESTIMMUNG DER GRENZEN

```
>> l:solve([kreis,kubische_parabel],[x,y]);
```

```
(%o7) [ [  $x = 1.481173098129352$  %i +  $0.88816331439287$  ,  $y = 0.25569264940541$  %i -  $5.14494104966687$  ] , [  $x = 0.88816331439287$  -  $1.481173098129352$  %i ,  $y = 0.25569264940541$  %i -  $5.14494104966687$  ] , [  $x = 1.481173098129346$  %i -  $0.88816331439288$  ,  $y = 0.25569264940547$  %i +  $5.144941049666835$  ] , [  $x = -1.481173098129346$  %i -  $0.88816331439288$  ,  $y = 5.144941049666835$  -  $0.25569264940547$  %i ] , [  $x = -1.676329130378266$  ,  $y = -4.710617626648161$  ] , [  $x = 1.676329130378266$  ,  $y = 4.710617626648161$  ] ]
```

```
>> length(l);g1:ev(x,l[6][1]);g2:ev(x,l[5][1]);
```

```
(%o8) 6
```

```
(%o9) 1.676329130378266
```

```
(%o10) -1.676329130378266
```

Flächenintegral

```
>> f1:integrate(f(x),x,0,g1),numer;
```

```
rat: replaced 1.676329130378266 by 12896/7693 = 1.676329130378266
```

```
rat: replaced 1.676329130378266 by 12896/7693 = 1.676329130378266
```

```
rat: replaced 1.676329130378266 by 12896/7693 = 1.676329130378266
```

```
rat: replaced 1.676329130378266 by 12896/7693 = 1.676329130378266
```

```
rat: replaced 1.974136493037667 by 11831/5993 = 1.974136492574671
```

```
(%o11) 1.974136492574671
```

```
>> f2:integrate(g(x),x,g1,r),numer;
```

```
rat: replaced 3.323670869621734 by 25569/7693 = 3.323670869621734
```

```
rat: replaced 1.676329130378266 by 12896/7693 = 1.676329130378266
```

```
rat: replaced 3.323670869621734 by 25569/7693 = 3.323670869621734
```

```
rat: replaced 0.5 by 1/2 = 0.5
```

```
rat: replaced 0.5 by 1/2 = 0.5
```

```
rat: replaced 3.323670869621734 by 25569/7693 = 3.323670869621734
```

```
rat: replaced 1.676329130378266 by 12896/7693 = 1.676329130378266
```

```
rat: replaced 3.323670869621734 by 25569/7693 = 3.323670869621734
```

```
rat: replaced 0.5 by 1/2 = 0.5
```

```
rat: replaced 3.323670869621734 by 25569/7693 = 3.323670869621734
```

```
rat: replaced 1.676329130378266 by 12896/7693 = 1.676329130378266
```

```
rat: replaced 3.323670869621734 by 25569/7693 = 3.323670869621734
```

```
rat: replaced 0.2 by 1/5 = 0.2
```

```
rat: replaced 0.5 by 1/2 = 0.5
```

```
rat: replaced 12.5 by 25/2 = 12.5
```

```
(%o12) 11.41308895975141
```

Flächenintegral

```
>> f3:integrate(h(x),x,g2,r),numer;
```

```
rat: replaced 6.676329130378266 by 51361/7693 = 6.676329130378266
```

```
rat: replaced -1.67632913037827 by -12896/7693 = -1.67632913037827
```

```
rat: replaced 6.676329130378266 by 51361/7693 = 6.676329130378266
```

```
rat: replaced 0.5 by 1/2 = 0.5
```

```
rat: replaced 0.5 by 1/2 = 0.5
```

```
rat: replaced 6.676329130378266 by 51361/7693 = 6.676329130378266
```

```
rat: replaced -1.67632913037827 by -12896/7693 = -1.67632913037827
```

```
rat: replaced 6.676329130378266 by 51361/7693 = 6.676329130378266
```

```
rat: replaced 0.5 by 1/2 = 0.5
```

```
rat: replaced 6.676329130378266 by 51361/7693 = 6.676329130378266
```

```
rat: replaced -1.67632913037827 by -12896/7693 = -1.67632913037827
```

```
rat: replaced 6.676329130378266 by 51361/7693 = 6.676329130378266
```

```
rat: replaced 0.2 by 1/5 = 0.2
```

```
rat: replaced 0.5 by 1/2 = 0.5
```

```
rat: replaced 12.5 by 25/2 = 12.5
```

```
(%o13) - 27.85681921012101
```

```
>> f4:integrate(f(x),x,g2,0),numer;
```

```
rat: replaced 1.676329130378266 by 12896/7693 = 1.676329130378266
```

```
rat: replaced -1.67632913037827 by -12896/7693 = -1.67632913037827
```

```
rat: replaced 1.676329130378266 by 12896/7693 = 1.676329130378266
```

```
rat: replaced -1.67632913037827 by -12896/7693 = -1.67632913037827
```

```
rat: replaced 1.974136493037667 by 11831/5993 = 1.974136492574671
```

```
(%o14) - 1.974136492574671
```

Flächenintegral

ERGEBNIS

```
>> flaeche:f1+f2-f3+f4;flaeche:floor(flaeche*100+0.5)/100.0;
```

```
(%o16) 39.26990816987242
```

```
(%o17) 39.27
```

```
>> halbkreis:r**2*pi/2.0;halbkreis:floor(halbkreis*100+0.5)/100.0;
```

```
(%o19) 12.5  $\pi$ 
```

```
(%o20) 39.27
```

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