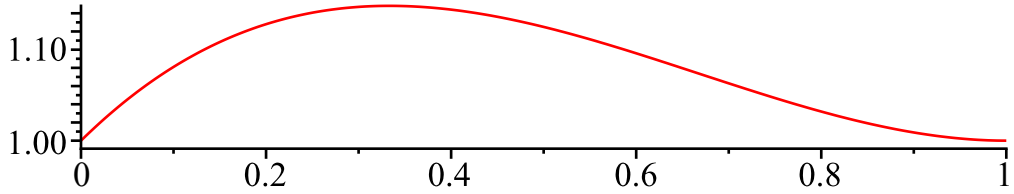
```
> restart;
> f:=t;
  g:=1+t-2*t^2+t^3;
```

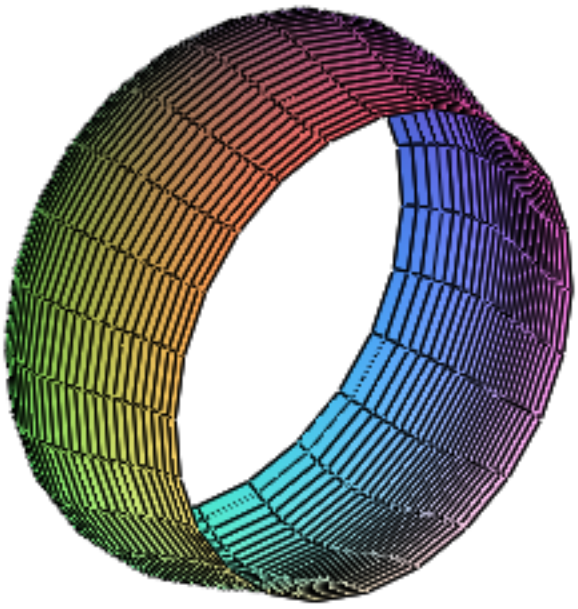
$$f := t$$

$$g := 1 + t - 2\,t^2 + t^3 \qquad (1)$$

```
> plot([f,g,t=0..1],scaling=constrained);
```




```
> plot3d([f,cos(theta)*g,sin(theta)*g],
    t=0..1,theta=0..2*Pi,scaling=constrained);
```



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

$$df := 1 \qquad (2)$$

```
> dg:=diff(g,t);
```

$$dg := 1 - 4\,t + 3\,t^2 \tag{3}$$

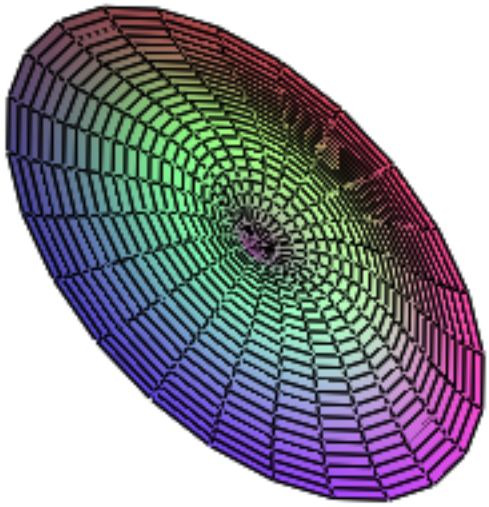
```
> A:=Int(2*Pi*g*sqrt(df^2+dg^2),t=0..1);
```

$$A := \int_0^1 2\,\pi\,(1 + t - 2\,t^2 + t^3)\,\sqrt{2 - 8\,t + 22\,t^2 - 24\,t^3 + 9\,t^4}\ dt \tag{4}$$

```
> evalf(A);
```

$$7.215730156 \tag{5}$$

```
> plot3d([cos(theta)*f,g,sin(theta)*f],
    t=0..1,theta=0..2*Pi,scaling=constrained);
```



```
> A:=Int(2*Pi*f*sqrt(df^2+dg^2),t=0..1);
```

$$A := \int_0^1 2\,\pi\,t\,\sqrt{2 - 8\,t + 22\,t^2 - 24\,t^3 + 9\,t^4}\ dt \tag{6}$$

```
> evalf(A);
```

$$3.243023901 \tag{7}$$

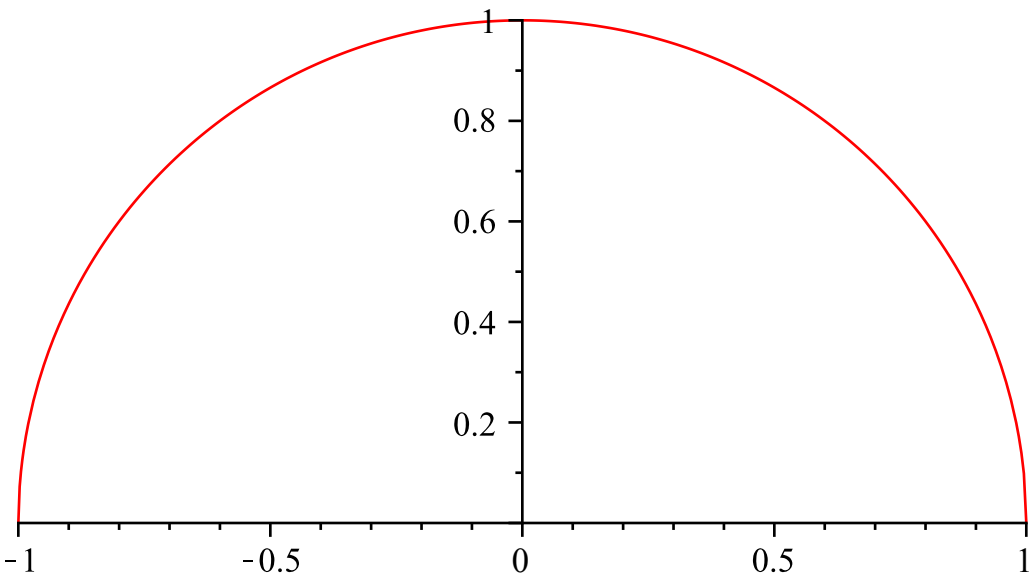
```
> f:=t;
```

$$f := t \tag{8}$$

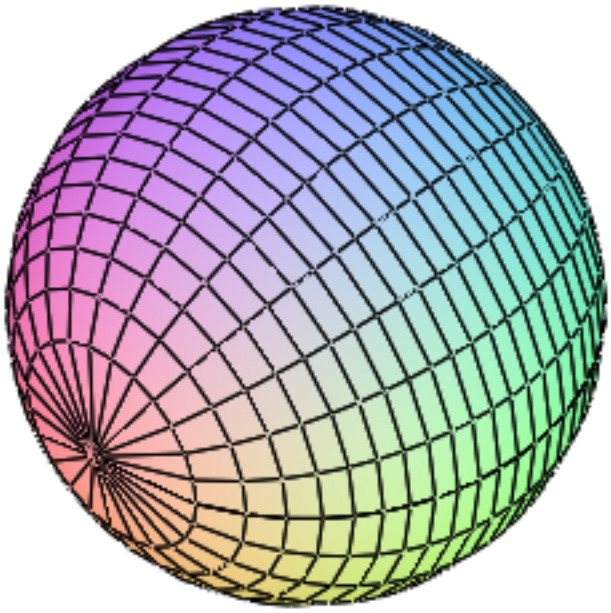
```
> g:=sqrt(1-t^2);
```

$$g := \sqrt{1 - t^2} \tag{9}$$

```
> plot([f,g,t=-1..1],scaling=constrained);
```




```
> plot3d([f,cos(theta)*g,sin(theta)*g],
      t=-1..1,theta=0..2*Pi,scaling=constrained);
```



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

$$df := 1 \tag{10}$$

```
> dg:=diff(g,t);
```

$$dg := -\frac{t}{\sqrt{1-t^2}} \tag{11}$$

```
> A:=int(2*Pi*g*sqrt(df^2+dg^2),t=-1..1);
```

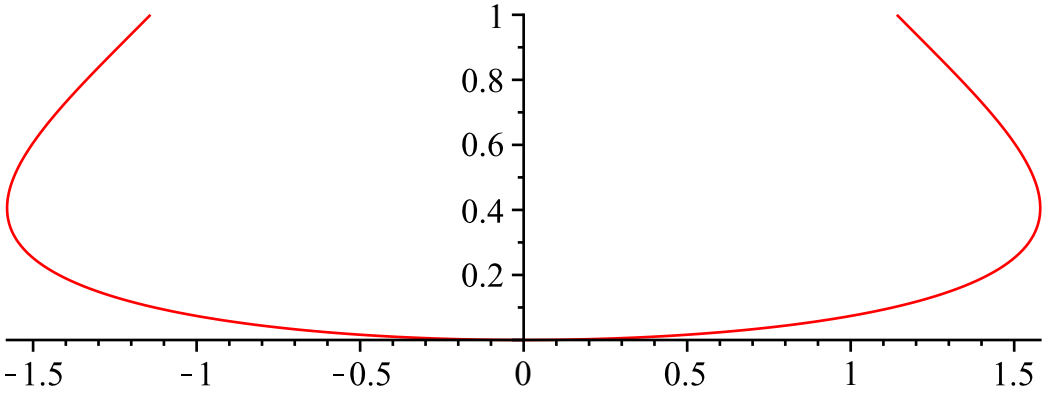
$$A := 4\,\pi \tag{12}$$

```
> f:=t+sin(3*t);
  g:=t^2;
```

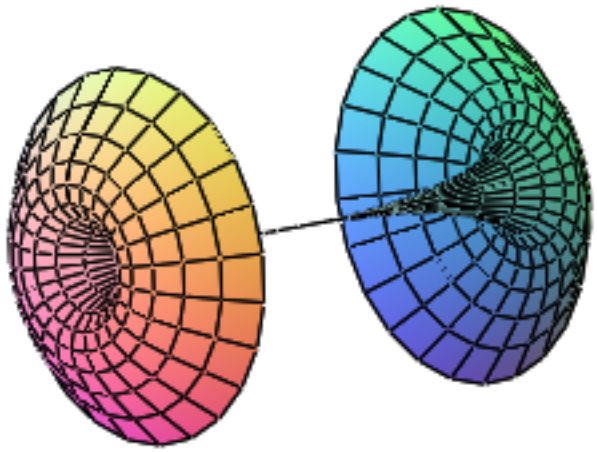
$$f := t + \sin(3\,t)$$

$$g := t^2 \tag{13}$$

```
> plot([f,g,t=-1..1],scaling=constrained);
```




```
> plot3d([f,cos(theta)*g,sin(theta)*g],
     t=-1..1,theta=0..2*Pi,scaling=constrained);
```



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

$$df := 1 + 3\cos(3\,t) \tag{14}$$

```
> dg:=diff(g,t);
```

$$dg := 2\,t \tag{15}$$

```
> A:=Int(2*Pi*g*sqrt(dg^2+df^2),t=-1..1);
```

$$A := \int_{-1}^{1} 2\,\pi\,t^2\,\sqrt{4\,t^2 + (1 + 3\cos(3\,t))^2}\,dt \tag{16}$$

```
> evalf(A);
```

$$8.802499018 \tag{17}$$