

Example 1

In this example, we are supposed to discuss arc length and use Maple to help us compute it. What's wrong with the following "solution"?

Calculating Arc Length

Given equations in parametric form, we are able to use Maple to calculate the arc length of a function over a given interval. In this example we are going to calculate the arc length of the function $\langle 3\cos(t), 3\sin(t) \rangle$, a circle with a radius of 3, from 0 to 2π . The calling sequence in Maple is as follows:

```
with(VectorCalculus);  
evalf(ArcLength(<3*cos(t),3*sin(t)>,t=0..2*Pi))
```

This gives us an answer in decimal form 18.84944, which is equal to 6π . As the function in this example is a perfect circle, the arc length from 0 to 2π will just be the circumference of the circle $C = 2 * \pi * r$. Thus we know this answer will be 6π .

Here is a more complex example given the function $\langle \cos(t) + 5, t, t^2 \rangle$:

```
with(VectorCalculus); evalf(ArcLength(<cos(t)+5,t,t^2>,t=0..5));
```

Here we get an answer of 26.1957. If you want the answer to appear in exact form instead of decimal form, replace the evalf command with simplify. In this case the answer in exact form is an intergral.

Suggested corrections:

- Give the arc length formula in mathematical terms first.
- Set off the function on its own line, and remember to use `\sin` and `\cos` when typesetting those.
- In fact, a better way to state the second line is to tell the reader what the function is first, then give the function. For example:

To verify Maple's computation, we'll first consider the arc length of a circle of radius 3. Mathematically, we will compute the arc length for the parametric function below:

$$\mathbf{r}(t) = \langle 3 \cos(t), 3 \sin(t) \rangle \quad 0 \leq t \leq 2\pi$$

which is the circumference 6π .

- Distinguish between Maple code, like `C=2*Pi*r` and mathematics notation, like $C = 2\pi r$.
- Try not to use a lot of short, choppy sentences- Keep a single idea together.
- The second example should follow the same suggestions as the first.
- Run the spell checker!
- “replace the `evalf` command with `simplify`” would better be written as:

The exact form of the arc length will be given by:

```
ArcLength(<x(t), y(t), z(t)>,t=a..b);
```

and a numerical approximation can be obtained using `evalf`:

```
evalf(ArcLength(<x(t), y(t), z(t)>,t=a..b));
```