02-11-2019

Ex:

- $\displaystyle\int_{10}^{\infty} \frac{1+\cos^2(x)}{\sqrt{x}\,(2-\sin^4(3x))}\,dx$ Looks like this'll diverge. Let's find then a smaller function that will diverge.

Let's find it: $\dfrac{1+\cos^2(x)}{\sqrt{x}\,(2-\sin^4(3x))}$ → we know: $0 \le \cos^2(x) \le 1$, then

$$\ge \frac{1}{\sqrt{x}\,(2-\sin^4(3x))} \qquad 0 \le \sin^4(3x) \le 1$$

$$\ge \frac{1}{\sqrt{x}\,(2)} = \frac{1}{2}\cdot\frac{1}{x^{1/2}}$$

We know $\frac{1}{2}\int_c^{\infty}\frac{1}{x^{1/2}}\,dx$ diverges since $\frac{1}{2} \le 1$.

Therefore by comparison test, the original integral diverges.

Things about 1st exam:

→ "Here's a bunch of integrals, do them".

→ Integration by parts, fundamental.

→ Trig. integrals.

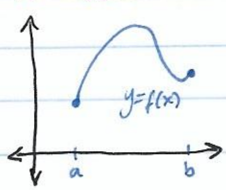
→ Trig. substitutions

→ Partial Fractions (Integral).

→ Improper Integrals

→ Comparison Test

ARC LENGTH:



What's the length of this curve

So, given a curve by $y=f(x)$, The arclength is calculated by:

$$\boxed{L = \int_a^b \sqrt{1+[f'(x)]^2}\,dx = \int_a^b \sqrt{1+[dy/dx]^2}\,dx} \qquad y=f(x),\ a \le x \le b$$

$$\boxed{L = \int_c^d \sqrt{1+[g'(y)]^2}\,dy = \int_c^d \sqrt{1+[dx/dy]^2}\,dy} \qquad x=g(y),\ c \le y \le d$$

→ Another way of writing the arclength formula is:

$$L = \int ds$$

where ds can be something different depending on how the curve is given.

$$ds = \sqrt{1 + (dy/dx)^2}\, dx \quad \text{if} \quad y = f(x), \quad a \leq x \leq b$$

or

$$ds = \sqrt{1 + (dx/dy)^2}\, dy \quad \text{if} \quad x = g(y), \quad c \leq y \leq d$$