20181019c applications of integration

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### Marginal costs and Total costs

Recall in differentiation we calculate the marginal costs from the total costs  
To apply integration they would simply just give the equation of marginal costs  
And ask us to integrate that into total costs  
The only thing matter would be the constant c  
And that could be derived by considering the fixed costs

library(Ryacas)  
library(mosaic)

Find the total cost function if the marginal cost is q + 5\*q^2 + exp(q) and the fixed cost is 10

# Integrating the function  
q = Sym('q')  
Integrate(q + 5\*q^2 + exp(q),q)

## expression(5 \* q^3/3 + q^2/2 + exp(q))

# Finding 'c'  
# 5 \* q^3/3 + q^2/2 + exp(q) + c == 10 when q == 0 (definition of fixed costs)  
Eval(5 \* q^3/3 + q^2/2 + exp(q), list(q=0)) # 1

## [1] 1

c = 10 - 1  
TC = 5 \* q^3/3 + q^2/2 + exp(q) + 9  
TC

## expression(5 \* q^3/3 + q^2/2 + exp(q) + 9)