## Integration By Substitution Math 106 Lecture 6

Dr. Nasser Bin Turki

King Saud University Department of Mathematics

2015

/□ ▶ < 글 ▶ < 글

Not every Integration can be easly evalue it in a sample way or direct way. So, we need to look at the method of Integration. The first meathd for today is Integration by substution. Not every Integration can be easly evalue it in a sample way or direct way. So, we need to look at the method of Integration. The first meathd for today is Integration by substution. Def: Integration By Substitution: Let g be a differentiable function on [a, b] and its derivative is continuous function. Let f be a continuous function on I. If F is the anti derivative for the function f on I then

Not every Integration can be easly evalue it in a sample way or direct way. So, we need to look at the method of Integration. The first meathd for today is Integration by substution. Def: Integration By Substitution: Let g be a differentiable function on [a, b] and its derivative is continuous function. Let f be a continuous function on I. If F is the anti derivative for the function f on I then

$$\int f(g(x))g'(x)dx = F(g(x)) + c, \quad \forall x \in [a, b].$$

~

• (1) 
$$\int 2x(x^2+5)^7 dx$$
?

3

• (1) 
$$\int 2x(x^2+5)^7 dx$$
?

• (2) 
$$\int (3x-1)^8 dx$$
?

• (1) 
$$\int 2x(x^2+5)^7 dx$$
?  
• (2)  $\int (3x-1)^8 dx$ ?

• (3) 
$$\int \frac{x}{4-5x^2} dx$$
?

• (1) 
$$\int 2x(x^2+5)^7 dx$$
?  
• (2)  $\int (3x-1)^8 dx$ ?  
• (3)  $\int \frac{x}{4-5x^2} dx$ ?

• (4) 
$$\int \frac{dx}{1+9x^2} dx$$
?

• (1) 
$$\int 2x(x^2+5)^7 dx$$
?  
• (2)  $\int (3x-1)^8 dx$ ?  
• (3)  $\int \frac{x}{4-5x^2} dx$ ?

• (4) 
$$\int \frac{dx}{1+9x^2} dx$$
?

• (5) 
$$\int x^2 \sin(x^3 + 1) dx$$
?

• (1) 
$$\int 2x(x^2+5)^7 dx$$
?  
• (2)  $\int (3x-1)^8 dx$ ?

• (3) 
$$\int \frac{x}{4-5x^2} dx$$
?

• (4) 
$$\int \frac{dx}{1+9x^2} dx$$
?

• (5) 
$$\int x^2 \sin(x^3 + 1) dx$$
?

• (6) 
$$\int \cos 3x \sqrt{\sin(3x)}^5 dx$$
?

• (1) 
$$\int 2x(x^2+5)^7 dx$$
?  
• (2)  $\int (3x-1)^8 dx$ ?

• (3) 
$$\int \frac{x}{4-5x^2} dx$$
?

• (4) 
$$\int \frac{dx}{1+9x^2} dx$$
?

• (5) 
$$\int x^2 \sin(x^3 + 1) dx$$
?

• (6) 
$$\int \cos 3x \sqrt{\sin(3x)}^5 dx$$
?

• 
$$\int (ax+b)^r dx = \frac{1}{a} \frac{(ax+b)^{r+1}}{r+1} + c \quad (r \in \mathbb{Q}), r \pm -1,$$

Dr. Nasser Bin Turki Integration By Substitution Math 106 Lecture 6

◆□ ▶ ◆□ ▶ ◆ □ ▶ ◆ □ ▶ ● □ ● ● ● ●

• 
$$\int (ax+b)^r dx = \frac{1}{a} \frac{(ax+b)^{r+1}}{r+1} + c$$
  $(r \in \mathbb{Q}), r \pm -1,$   
•  $\int \sin(ax+b) dx = \frac{-1}{a} \cos(ax+b) + c,$ 

◆□ ▶ ◆□ ▶ ◆ □ ▶ ◆ □ ▶ ● □ ● ● ● ●

• 
$$\int (ax+b)^r dx = \frac{1}{a} \frac{(ax+b)^{r+1}}{r+1} + c$$
  $(r \in \mathbb{Q}), r \pm -1,$   
•  $\int \sin(ax+b) dx = \frac{-1}{a} \cos(ax+b) + c,$   
•  $\int \cos(ax+b) dx = \frac{1}{a} \sin(ax+b) + c,$ 

• 
$$\int (ax + b)^r dx = \frac{1}{a} \frac{(ax+b)^{r+1}}{r+1} + c$$
  $(r \in \mathbb{Q}), r \pm -1,$   
•  $\int \sin(ax + b) dx = \frac{-1}{a} \cos(ax + b) + c,$   
•  $\int \cos(ax + b) dx = \frac{1}{a} \sin(ax + b) + c,$ 

Remarks: If we use the Integration By Substitution in the definite Integration we need to look at the new function in terms of limits of the integration.

3 N 4 3 N

• (1) 
$$\int_1^2 (3x-1)^3 dx$$
?

(E)

3

• (1) 
$$\int_1^2 (3x-1)^3 dx$$
?

• (3) 
$$\int_1^3 \frac{10x-7}{4+5x^2-7x} dx$$
?

э

∃ → < ∃</p>

Thanks for listening.

æ

- 4 聞 と 4 臣 と 4 臣 と