

31 Lecture - MTH101

Important Mcqs

What is the correct substitution for evaluating the definite integral of $\int_0^{\pi/2} \cos(x)\sin(x) dx$ from 0 to $\pi/2$?

- a) $u = \cos(x)$
- b) $u = \sin(x)$
- c) $u = \cos(x)\sin(x)$
- d) $u = 1 - \cos^2(x)$

Answer: b) $u = \sin(x)$

Explanation: Using the substitution $u = \sin(x)$, we get $du/dx = \cos(x) dx$. Substituting this into the integral and using the limits of integration, we get $\int_0^{\pi/2} \cos(x)\sin(x) dx$ from 0 to $\pi/2$ is equal to $\int_0^1 u du$ from 0 to 1, which evaluates to $1/2$.

What is the correct substitution for evaluating the definite integral of $\int_0^1 x^2\sqrt{x+1} dx$ from 0 to 1?

- a) $u = x+1$
- b) $u = x^2$
- c) $u = \sqrt{x+1}$
- d) $u = x+1/2$

Answer: a) $u = x+1$

Explanation: Using the substitution $u = x+1$, we get $du/dx = 1 dx$. Substituting this into the integral and using the limits of integration, we get $\int_0^1 x^2\sqrt{x+1} dx$ from 0 to 1 is equal to $\int_1^2 (u-1)^2 \sqrt{u} du$ from 1 to 2, which can be evaluated using integration by parts.

What is the correct substitution for evaluating the definite integral of $\int_0^{\pi/4} \sec(x)\tan(x) dx$ from 0 to $\pi/4$?

- a) $u = \sec(x)$
- b) $u = \tan(x)$
- c) $u = \sec(x)\tan(x)$
- d) $u = \sin(x)/\cos(x)$

Answer: a) $u = \sec(x)$

Explanation: Using the substitution $u = \sec(x)$, we get $du/dx = \sec(x)\tan(x) dx$. Substituting this into the integral and using the limits of integration, we get $\int_0^{\pi/4} \sec(x)\tan(x) dx$ is equal to $\int_2^1 u du$, which evaluates to $\ln(\sqrt{2} + 1)$.

What is the correct substitution for evaluating the definite integral of $\int_0^1 x^3 e^{(x^4+1)} dx$ from 0 to 1?

a) $u = x^4+1$

b) $u = e^{(x^4+1)}$

c) $u = x^3$

d) $u = e^x$

Answer: a) $u = x^4+1$

Explanation: Using the substitution $u = x^4+1$, we get $du/dx = 4x^3 dx$. Substituting this into the integral and using the limits of integration, we get $\int_0^1 x^3 e^{(x^4+1)} dx$ is equal to $(1/4) \int_1^2 e^u du$, which evaluates to $(e^2 - e)/4$.

What is the correct substitution for evaluating the definite integral of $\int_0^1 (x+1)\cos(x^2+2x+1) dx$ from 0 to 1?

a) $u = x^2+2x+1$

b) $u = \cos(x^2+2x+1)$

c) $u = x+1$

d) $u = \sin(x^2+2x+1)$

Answer: a) $u = x^2+2x+1$

Explanation: Using the substitution $u = x^2+2x+1$, we