Math 132 - Quiz 3 (IC)

February 27, 2020

Name key

Score

Show all work to receive full credit. Supply explanations when necessary.

1. (2 points) Evaluate the integral: $\int 3x\, e^{2x}\, dx$

PARTS...

$u = 3x \qquad du = 3\,dx$

$dv = e^{2x}\,dx \qquad v = \frac{1}{2}e^{2x}$

$$\frac{3}{2}xe^{2x} - \int \frac{3}{2}e^{2x}\,dx$$

$$= \frac{3}{2}xe^{2x} - \frac{3}{4}e^{2x} + C$$

2. (2 points) Evaluate the integral: $\int 5x\cos(1+2x^2)\,dx$

SUBS...

$u = 1 + 2x^2$

$du = 4x\,dx$

$\frac{1}{4}du = x\,dx$

$$\frac{5}{4}\int \cos u\,du = \frac{5}{4}\sin u + C$$

$$= \frac{5}{4}\sin(1+2x^2) + C$$

Math 132 - Quiz 3 (TH)

February 27, 2020

Name key

Score

Show all work to receive full credit. Supply explanations when necessary. This quiz is due no later than 3:15pm on March 3.

1. (2 points) Evaluate the integral: $\int_1^2 x^3 \ln x \, dx$

$u = \ln x \qquad du = \frac{1}{x}\,dx$

$dv = x^3\,dx \qquad v = \frac{1}{4}x^4$

$$\int_1^2 x^3 \ln x \, dx = \frac{1}{4}x^4 \ln x \Big|_1^2 - \int_1^2 \frac{1}{4}x^3\,dx$$

$$= \left[4\ln 2 - 0\right] - \left[\frac{1}{16}x^4\right]_1^2$$

$$= 4\ln 2 - 1 + \frac{1}{16}$$

$$= 4\ln 2 - \frac{15}{16}$$

2. (2 points) Evaluate the integral: $\int 3x^2 \sin \pi x, dx$

SIGNS	X AND DERIVS	dv/dx AND ANTI-D'S
+	$3x^2$	$\sin \pi x$
−	$6x$	$-\frac{1}{\pi} \cos \pi x$
+	6	$-\frac{1}{\pi^2} \sin \pi x$
−	0	$\frac{1}{\pi^3} \cos \pi x$

$$\int 3x^2 \sin \pi x \, dx = -\frac{3x^2}{\pi} \cos \pi x + \frac{6x}{\pi^2} \sin \pi x + \frac{6}{\pi^3} \cos \pi x + C$$

3. (2 points) Evaluate the integral: $\int \tan^5 x \sec^3 x \, dx$

$$\int \sec^2 x \underbrace{\tan^4 x}_{(\sec^2 x - 1)^2} \sec x \tan x \, dx$$

$$\int \sec^2 x \left(\sec^2 x - 1\right)^2 \sec x \tan x \, dx$$

$u = \sec x$

$du = \sec x \tan x \, dx$

$$\int u^2 (u^2 - 1)^2 \, du = \int (u^6 - 2u^4 + u^2) \, du = \frac{u^7}{7} - \frac{2}{5}u^5 + \frac{u^3}{3} + C$$

$$= \frac{\sec^7 x}{7} - \frac{2\sec^5 x}{5} + \frac{\sec^3 x}{3} + C$$