Name: Richard

MATH 200 – QUIZ 14 Ctrl Alt Del

Instructions: Show work and put a $\boxed{\text{box}}$ around your final answer. April 25, 2013

1. $\int_0^2 (3x - 4x^3)\, dx = \left[\frac{3}{2}x^2 - x^4\right]_0^2 = \left(\frac{3}{2}2^2 - 2^4\right) - \left(\frac{3}{2}0^2 - 0^4\right) = \frac{3\cdot 4}{2} - 16 = 6 - 16$
$= \boxed{-10}$

2. $\int_{-\pi/2}^{\pi/2} \cos(x)\, dx = \left[\sin(x)\right]_{-\pi/2}^{\pi/2} = \sin\left(\frac{\pi}{2}\right) - \sin\left(-\frac{\pi}{2}\right) = 1 - (-1) = \boxed{2}$

3. $\int \frac{1}{x^2}\sqrt{2 - \frac{1}{x}}\, dx = \int \sqrt{2 - \frac{1}{x}}\, \frac{1}{x^2}\, dx = \int \sqrt{u}\, du = \int u^{\frac{1}{2}} du = \frac{u^{\frac{1}{2}+1}}{\frac{1}{2}+1} + C$

$u = 2 - \frac{1}{x}$

$\frac{du}{dx} = 0 - \frac{-1}{x^2} = \frac{1}{x^2}$

$du = \frac{1}{x^2} dx$

$= \frac{u^{3/2}}{\frac{3}{2}} + C = \frac{2}{3}\sqrt{u}^3 + C = \boxed{\frac{2}{3}\sqrt{2 - \frac{1}{x}}^3 + C}$

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MATH 200 – QUIZ 14 Enter

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1. $\int_0^9 \sqrt{x}\, dx = \int_0^9 x^{\frac{1}{2}} dx = \left[\frac{1}{\frac{1}{2}+1} x^{\frac{1}{2}+1}\right]_0^9 = \left[\frac{1}{\frac{3}{2}} x^{3/2} + C\right]_0^9 = \left[\frac{2}{3}\sqrt{x}^3\right]_0^9$
$= \frac{2}{3}\sqrt{9}^3 - \frac{2}{3}\sqrt{0}^3 = \frac{2}{3}3^3 = \boxed{18}$

2. $\int_{-1}^1 (x^2 + x + 1)\, dx = \left[\frac{x^3}{3} + \frac{x^2}{2} + x\right]_{-1}^1 = \left(\frac{1^3}{3} + \frac{1^2}{2} + 1\right) - \left(\frac{(-1)^3}{3} + \frac{(-1)^2}{2} + (-1)\right)$
$= \frac{1}{3} + \frac{1}{2} + 1 + \frac{1}{3} - \frac{1}{2} + 1 = \frac{2}{3} + 2 = \frac{2}{3} + \frac{6}{3} = \boxed{\frac{8}{3}}$

3. $\int \sin^6(\pi x)\cos(\pi x)\, dx = \int (\sin(\pi x))^6 \cos(\pi x)\, dx = \frac{1}{\pi}\int (\sin(\pi x))^6 \cos(\pi x)\pi\, dx$

$u = \sin(\pi x)$

$\frac{du}{dx} = \cos(\pi x)\pi$

$du = \cos(\pi x)\pi\, dx$

$= \frac{1}{\pi}\int u^6 du = \frac{1}{\pi}\frac{u^7}{7} + C$

$= \boxed{\frac{\sin^7(\pi x)}{7\pi} + C}$

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MATH 200 – QUIZ 14 Shift ⇑

Instructions: Show work and put a $\boxed{\text{box}}$ around your final answer.

April 25, 2013

1. $\int_1^{e^2} \frac{1}{x}\,dx = \left[\ln|x|\right]_1^{e^2} = \ln|e^2| - \ln|1| = 2 - 0 = \boxed{2}$

2. $\int_1^2 \left(1+\frac{1}{x^2}\right)\,dx = \int_1^2 (1+x^{-2})\,dx = \left[x + \frac{1}{-2+1}x^{-2+1}\right]_1^2 = \left[x - x^{-1}\right]_1^2$

$= \left[x - \frac{1}{x}\right]_1^2 = \left(2-\frac{1}{2}\right)-\left(1-\frac{1}{1}\right) = \boxed{3/2}$

3. $\int \sin(x)e^{\cos(x)}\,dx = \int e^{\cos(x)}\sin(x)\,dx = -\int e^{\cos(x)}(-\sin(x))\,dx$

$u = \cos(x)$
$\frac{du}{dx} = -\sin(x)$
$du = -\sin(x)\,dx$

$= -\int e^u\,du = -e^u + C$

$= \boxed{-e^{\cos(x)} + C}$

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MATH 200 – QUIZ 14 Esc

Instructions: Show work and put a $\boxed{\text{box}}$ around your final answer.

April 25, 2013

1. $\int_0^{\pi/3} \sec^2(x)\,dx = \left[\tan(x)\right]_0^{\pi/3} = \tan\left(\frac{\pi}{3}\right) - \tan(0) = \sqrt{3} - 0 = \boxed{\sqrt{3}}$

2. $\int_1^2 x\left(x+\frac{1}{x}\right)\,dx = \int_1^2 (x^2+1)\,dx = \left[\frac{x^3}{3}+x\right]_1^2 = \left(\frac{2^3}{3}+2\right)-\left(\frac{1^3}{3}+1\right) = \boxed{\frac{10}{3}}$

3. $\int x\sqrt{1-x^2}\,dx = \int (1-x^2)^{\frac{1}{2}}x\,dx = -\frac{1}{2}\int(1-x^2)^{\frac{1}{2}}(-2x)\,dx$

$u = 1-x^2$
$\frac{du}{dx} = -2x$
$du = -2x\,dx$

$= -\frac{1}{2}\int u^{1/2}\,du = -\frac{1}{2}\frac{1}{\frac{1}{2}+1}u^{\frac{1}{2}+1} + C$

$= -\frac{1}{2}\frac{1}{\frac{3}{2}}u^{3/2} + C = -\frac{1}{3}\sqrt{u}^3 + C$

$= \boxed{-\frac{1}{3}\sqrt{1-x^2}^{\,3} + C}$