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232 Quiz 3

March 28, 2014

Name: * Key *

Work on your own with no phones or calculators of any kind. You may use your Notebooks but no other materials.

- Calculate each of the following indefinite integrals, using whatever techniques you like. The problems are not necessarily in order of difficulty. Show your work clearly.

5 pts

a) $\int x^2 \ln x \, dx$

$u = \ln x \rightarrow du = \frac{1}{x} dx$
 $v = \frac{1}{3} x^3 \leftarrow dv = x^2 dx$

$\hookrightarrow = \frac{1}{3} x^3 \ln x - \frac{1}{3} \int \underbrace{x^3 \cdot \frac{1}{x}}_{x^2} dx = \boxed{\frac{1}{3} x^3 \ln x - \frac{1}{3} \cdot \frac{1}{3} x^3 + C}$

5 pts

b) $\int \frac{x^2}{\sec x^3} dx$

$u = x^3$
 $du = 3x^2 dx$
 $\frac{1}{3} du = x^2 dx$

$\hookrightarrow = \frac{1}{3} \int \frac{1}{\sec u} du = \frac{1}{3} \int \cos u du = \frac{1}{3} \sin u + C = \boxed{\frac{1}{3} \sin x^3 + C}$

5 pts

c) $\int \frac{3^x}{4^x} dx = \int \left(\frac{3}{4}\right)^x dx$

$\hookrightarrow = \boxed{\frac{1}{\ln(3/4)} \left(\frac{3}{4}\right)^x + C}$

5 pts

d) $\int e^x \cos x \, dx$

$u = e^x \rightarrow du = e^x dx$
 $v = \sin x \leftarrow dv = \cos x dx$

$\hookrightarrow = e^x \sin x - \int e^x \sin x \, dx$

$u = e^x \rightarrow du = e^x dx$
 $v = -\cos x \leftarrow dv = \sin x dx$

$\hookrightarrow = e^x \sin x - \left(-e^x \cos x + \int e^x \cos x \, dx \right)$

So $I = e^x \sin x + e^x \cos x - I$
 $\Rightarrow 2I = e^x \sin x + e^x \cos x + C \Rightarrow I = \boxed{\frac{1}{2}(e^x \sin x + e^x \cos x) + C}$