Math 1210: Quiz #10 — Fall 2017

Name: Solution	A#:	Section: H

[5] 1. $\int (2x-1)(x^2-x+3)^4 dx$

$\circledast$ let $u = x^2 - x + 3$

$du = (2x-1)dx$

$\overset{\circledast}{=} \int u^4 du$

$= \frac{1}{5} u^5 + C$

$\boxed{= \frac{1}{5}(x^2-x+3)^4 + C}$

[5] 2. $\int \tan(x)\sec(x)e^{\sec(x)}dx$

$\circledast$ let $u = \sec(x)$

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

$\overset{\circledast}{=} \int e^u du$

$= e^u + C$

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

v10.GH

[5] 3. $\displaystyle\int_0^{\ln(2)} \frac{5e^x}{2e^x - 1}dx$

$\circledast$ let $u = 2e^x - 1$

$du = 2e^x dx$

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

when $x = \ln(2)$, $u = 2e^{\ln 2} - 1 = 3$

when $x = 0$, $u = 2e^0 - 1 = 1$

$= 5\displaystyle\int_0^{\ln(2)} \frac{e^x}{2e^x - 1} dx$

$\overset{*}{=} 5\displaystyle\int_1^3 \frac{1}{u} \cdot \frac{1}{2} du$

$= \frac{5}{2}\displaystyle\int_1^3 \frac{1}{u} du = \frac{5}{2}\left[\ln u \Big|_1^3\right] = \frac{5}{2}\left[\ln 3 - \cancel{\ln 1}\right] = \boxed{\frac{5}{2}\ln 3}$

[5] 4. $\displaystyle\int_1^{\sqrt{3}} \frac{1}{(x^2+1)\tan^{-1}(x)}dx$

$\circledast$ Let $u = \tan^{-1}(x)$

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

when $x = \sqrt{3}$, $u = \tan^{-1}(\sqrt{3}) = \frac{\pi}{3}$

when $x = 1$, $u = \tan^{-1}(1) = \frac{\pi}{4}$

$= \displaystyle\int_1^{\sqrt{3}} \frac{1}{\tan^{-1}(x)} \cdot \frac{1}{x^2+1} dx$

$\overset{\circledast}{=} \displaystyle\int_{\pi/4}^{\pi/3} \frac{1}{u} du$

$= \ln u \Big|_{\pi/4}^{\pi/3} = \ln\frac{\pi}{3} - \ln\frac{\pi}{4} = \ln\left(\frac{\pi/3}{\pi/4}\right) = \boxed{\ln(4/3)}$