QUIZ 9: 4.4, 4.5

Evaluate the following integrals (2 points each)

1) $\int_0^{\pi/4}\left(\cos x + \sec^2 x\right)dx$

$= \sin x + \tan x \ \Big]_0^{\pi/4}$

$= \sin\frac{\pi}{4} + \tan\frac{\pi}{4} - (\sin 0 + \tan 0)$

$= \boxed{\frac{\sqrt{2}}{2} + 1}$

2) $\int_1^8\left(4x + x^{2/3}\right)dx$

$2x^2 + \frac{3}{5}x^{5/3}\ \Big]_1^8$

$128 + \frac{96}{5} - (2 + \frac{3}{5})$

$= 126 + \frac{93}{5} = \boxed{\frac{723}{5}}$

Evaluate the following integrals. (4 points each)

3) $\int_0^4 t\sqrt{t^2+9}\ dt$ $u = t^2+9$
$du = 2t\ dt$

$\frac{1}{2}\int_9^{25} u^{1/2}\ du$

$\frac{1}{3}\ u^{3/2}\ \Big]_9^{25}$

$\frac{1}{3}\left(25^{3/2} - 9^{3/2}\right)$

$\frac{1}{3}(125 - 27) = \boxed{\frac{98}{3}}$

4) $\int x\sqrt{5x+1}\ dx$ $u = 5x+1$ $\quad x = \frac{u-1}{5}$
$du = 5dx$

$\int \frac{u-1}{5}\ \sqrt{u}\ \frac{du}{5} = \frac{1}{25}\int \left(u^{3/2} - u^{1/2}\right)du$

$\frac{1}{25}\left(\frac{2}{5}u^{5/2} - \frac{2u^{3/2}}{3}\right) + C$

$\boxed{\frac{2}{125}(5x+1)^{5/2} - \frac{2}{75}(5x+1)^{3/2} + C}$

5) $\int \sin(5\theta)\ d\theta$

$u = 5\theta$
$du = 5d\theta$

$\frac{1}{5}\int \sin u\ du$

$-\frac{1}{5}\cos u + C$

$\boxed{-\frac{1}{5}\cos(5\theta) + C}$

6) $\int_{-\pi/2}^{\pi/2} \frac{\cos x}{\sqrt{\sin x + 1}}\ dx$:

$u = \sin x + 1$
$du = \cos x\ dx$

$\int_-^- \frac{du}{\sqrt{u}} = \int_-^- u^{-1/2}\ du$

$= 2u^{1/2}\ \Big]_-^- = 2\sqrt{\sin x + 1}\ \Big]_{-\frac{\pi}{2}}^{\frac{\pi}{2}}$

$= \boxed{2\sqrt{2}}$