

## QUIZ 6

$$\int_0^{\pi/4} \sec^6 x \tan x \, dx$$

$$u = \sec x$$

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

$$dx = \frac{du}{\sec x \tan x}$$

Bounds:

$x$	$u = \sec x = \frac{1}{\cos x}$
$\pi/4$	$\sec \pi/4 = \frac{1}{\cos \pi/4} = \frac{1}{(1/\sqrt{2})} = \sqrt{2}$
$0$	$\sec 0 = \frac{1}{\cos 0} = \frac{1}{1} = 1$

$$= \int_{u=1}^{u=\sqrt{2}} \sec^6 x \tan x \left( \frac{du}{\sec x \tan x} \right)$$

$$= \int_{u=1}^{u=\sqrt{2}} \sec^5 x \, du$$

$$= \int_1^{\sqrt{2}} u^5 \, du$$

$$= \frac{1}{6} u^6 \Big|_1^{\sqrt{2}}$$

$$= \frac{1}{6} (\sqrt{2})^6 - \frac{1}{6} (1)^6$$

$$= \frac{8}{6} - \frac{1}{6}$$

$$= \frac{7}{6}$$

## QUIZ 6

$$\int_{\pi/4}^{\pi/2} \csc^6 x \cot x \, dx$$

$$u = \csc x$$

$$du = -\csc x \cot x \, dx$$

$$dx = -\frac{du}{\csc x \cot x}$$

Bounds:

$x$	$u = \csc x = \frac{1}{\sin x}$
$\pi/2$	$\csc \pi/2 = \frac{1}{\sin \pi/2} = \frac{1}{1} = 1$
$\pi/4$	$\csc \pi/4 = \frac{1}{\sin \pi/4} = \frac{1}{(1/\sqrt{2})} = \sqrt{2}$

$$= \int_{u=\sqrt{2}}^{u=1} \csc^6 x \cot x \left(-\frac{du}{\csc x \cot x}\right)$$

$$= -\int_{u=\sqrt{2}}^{u=1} \csc^5 x \, du$$

$$= -\int_{\sqrt{2}}^1 u^5 \, du$$

$$= -\frac{1}{6} u^6 \Big|_{\sqrt{2}}^1$$

$$= -\frac{1}{6} (1)^6 - \left[-\frac{1}{6} (\sqrt{2})^6\right]$$

$$= -\frac{1}{6} + \frac{8}{6}$$

$$= \frac{7}{6}$$