Math 2300 **Name:** Champ
Spring 2026
Quiz 2

1. (2 points) Which of the following is the result of a valid u-substitution for the following integral?

$$\int_0^{\pi/6} \sin^3(x)\cos^4(x)\,dx$$

(a) $\displaystyle\int_1^{\sqrt{3}/2} (u^6 - u^4)\,du$

(b) $\displaystyle\int_0^{1/2} u^3(1-u^2)^2\,du$

(c) $\displaystyle\int_1^{\sqrt{3}/2} u^4(1-u)^2\,du$

(d) $\displaystyle\int_0^{\sqrt{3}/2} u^3(1-u^4)\,du$

(e) $\displaystyle\int_0^{\pi/6} u^3u^4\,du$

$\int_0^{\pi/6} \sin^2(x)\cos^4(x)\cdot\sin(x)\,dx$

$\int_0^{\pi/6} (1-\cos^2 x)\cos^4(x)\cdot\sin(x)\,dx$

$u = \cos(x) \qquad du = -\sin(x)$

$-\int_1^{\sqrt{3}/2} (1-u^2)u^4\,du$

$\int_1^{\sqrt{3}/2} u^6 - u^4\,du$

2. (2 points) Which of the following is the result of a valid u-substitution for the following integral?

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

(a) $\displaystyle\int_0^1 u^4(1+u^2)\,du$

(b) $\displaystyle\int_0^1 u^4(1-u^2)\,du$

(c) $\displaystyle\int_0^1 u^3(1+u^2)\,du$

(d) $\displaystyle\int_1^{\sqrt{2}} (u^2-1)^2\,du$

(e) $\displaystyle\int_0^{\pi/4} u^4u^2\,du$

$\int_0^{\pi/4} \sec^2(x)\tan^4(x)\cdot\sec^2(x)\,dx$

$\int_0^{\pi/4} (1+\tan^2(x))\tan^4(x)\cdot\sec^2(x)\,dx$

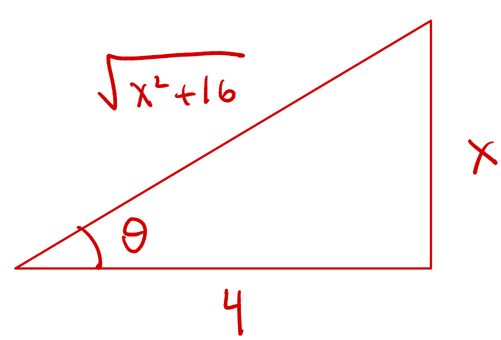
let $u = \tan(x) \quad du = \sec^2(x)$

$\int_0^1 (1+u^2)u^4\,du$

3. (2 points) Which substitution is appropriate for computing the following integral?

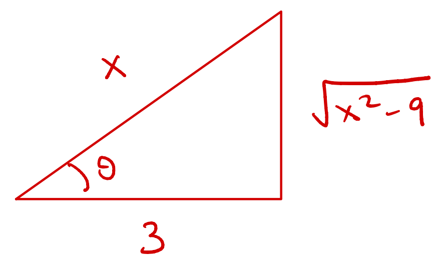
$$\int \frac{\sqrt{x^2+16}}{x^2}\,dx$$

(a) $x = 4\sec\theta$
(b) $x = 4\tan\theta$
(c) $x = 4\sin\theta$
(d) $x = 4\csc\theta$
(e) $x = 16\sec\theta$



4. (4 points) Compute the following indefinite integral.

$$\int \frac{1}{x^2\sqrt{x^2-9}}\,dx$$



Let $x = 3\sec\theta$

Then $dx = 3\sec\theta\tan\theta\, d\theta$

From the triangle, $\sqrt{x^2-9} = 3\tan\theta$

$$\int \frac{1}{x^2\sqrt{x^2-9}}\,dx = \int \frac{1}{9\sec^2\theta \cdot 3\tan\theta} \cdot 3\sec\theta\tan\theta\, d\theta$$

$$= \int \frac{1}{9\sec\theta}\, d\theta$$

$$= \frac{1}{9}\int \cos\theta\, d\theta$$

$$= \frac{1}{9}\sin\theta + C$$

From the triangle, $\sin\theta = \frac{\sqrt{x^2-9}}{x}$

$$\boxed{= \frac{1}{9}\cdot\frac{\sqrt{x^2-9}}{x} + C}$$