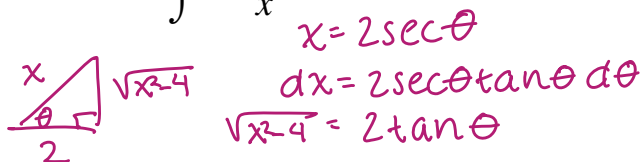


Quiz Review - 7.5

3 pts. per problem. Clearly show *all* work. 15 pts.
No calculators.

Name: Key
Per.: _____

1) $\int \frac{\sqrt{x^2-4}}{x} dx$



$x = 2\sec\theta$
 $dx = 2\sec\theta \tan\theta d\theta$
 $\sqrt{x^2-4} = 2\tan\theta$

$$= \int \frac{2\tan\theta}{2\sec\theta} \cdot 2\sec\theta \tan\theta d\theta$$

$$= 2 \int \tan^2\theta d\theta$$

$$= 2 \int (\sec^2\theta - 1) d\theta$$

$$= 2 \tan\theta - 2\theta + C$$

$$= \boxed{\sqrt{x^2-4} - 2\operatorname{arcsec} \frac{x}{2} + C}$$

2) $\int \ln x dx$

$u = \ln x$ $dv = dx$
 $du = \frac{1}{x} dx$ $v = x$

$$\int \ln x dx = x \ln x - \int x \cdot \frac{1}{x} dx$$

$$= x \ln x - \int dx$$

$$= \boxed{x \ln x - x + C}$$

3) $\int 6^x dx =$

$$\boxed{\frac{6^x}{\ln 6} + C}$$

4) $\int \frac{3x^2-7x-2}{x^3-x} dx = \int \frac{3x^2-7x-2}{x(x+1)(x-1)} dx$

$$\frac{3x^2-7x-2}{x^3-x} = \frac{A}{x} + \frac{B}{x+1} + \frac{C}{x-1}$$

$$3x^2-7x-2 = A(x+1)(x-1) + Bx(x-1) + Cx(x+1)$$

$$= Ax^2 - A + Bx^2 - Bx + Cx^2 + Cx$$

$$= (A+B+C)x^2 + (C-B)x + (-A)$$

$$A+B+C = 3 \Rightarrow 2+B+B-7 = 3 \Rightarrow B = 4$$

$$C-B = -7 \Rightarrow C = B-7 \Rightarrow C = -3$$

$$-A = -2 \Rightarrow A = 2$$

$$\int \frac{2}{x} + \frac{4}{x+1} - \frac{3}{x-1} dx$$

$$= \boxed{2\ln|x| + 4\ln|x+1| - 3\ln|x-1| + C}$$

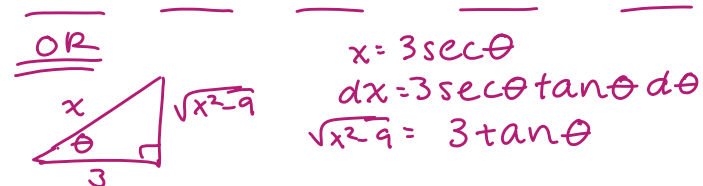
Note: If used $\frac{A}{x} + \frac{Bx+C}{x^2-1} \Rightarrow \frac{2}{x} + \frac{x-7}{x^2-1}$
 Be sure to factor completely \rightarrow Need partial fractions again

5) $\int \frac{-5x}{\sqrt{x^2-9}} dx$ $u = x^2-9$
 $du = 2x dx$

$$-\frac{5}{2} \int \frac{1}{\sqrt{u}} du = -\frac{5}{2} \int u^{-1/2} du$$

$$= -\frac{5}{2} \cdot \frac{2}{1} u^{1/2} + C$$

$$= \boxed{-5\sqrt{x^2-9} + C}$$



$$\int \frac{-5x}{\sqrt{x^2-9}} dx = \int \frac{-5 \cdot 3\sec\theta}{3\tan\theta} \cdot 3\sec\theta \tan\theta d\theta$$

$$= \int -15 \sec^2\theta d\theta = -15 \tan\theta + C$$

$$= -15 \left(\frac{\sqrt{x^2-9}}{3} \right) + C$$

$$= \boxed{-5\sqrt{x^2-9} + C}$$