

## Circuit Training – Integrals of “Rational” Expressions

Name \_\_\_\_\_

Directions: Begin in cell #1. Show the work necessary to evaluate the indefinite integral. Search for your answer. Continue in this manner until you complete the circuit. No technology needed.

#       1        
 $\int \frac{x}{x^2+1} dx$

Answer:  $-2 \ln|x + 1| + 3 \ln|x + 2| + C$

#         
 $\int \frac{x-1}{x^2-5x+4} dx$

Answer:  $\frac{1}{2}x^2 + \ln|x| + C$

#         
 $\int \frac{x}{\sqrt{x+1}} dx$

Answer:  $\tan^{-1}(x + 1) + C$

#         
 $\int \frac{1}{x^2+1} dx$

Answer:  $\ln|x + 1| + C$

#         
 $\int \frac{x}{1+x^4} dx$

Answer:  $\frac{1}{4} \ln(1+x^4) + C$

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

Answer:  $x - \frac{1}{x} + C$

# \_\_\_\_\_  
 $\int \frac{1}{x+1} dx$

Answer:  $\frac{1}{2} \ln(x^2+1) + C$

# \_\_\_\_\_  
 $\int \frac{x^3}{1+x^4} dx$

Answer:  $\ln|x - 4| + C$

# \_\_\_\_\_  
 $\int \frac{x^2+3x+4}{x+1} dx$

Answer:  $\frac{2}{3} \sqrt{(x+1)^3} - 2\sqrt{x+1} + C$

# \_\_\_\_\_  
 $\int \frac{x^2+1}{x} dx$

Answer:  $\arctan x + C$

# \_\_\_\_\_  
 $\int \frac{x+2}{\sqrt{x^2+4x}} dx$

Answer:  $\frac{1}{2} \tan^{-1}(x^2) + C$

# \_\_\_\_\_  
 $\int \frac{1}{4x^2+4x+1} dx$

Answer:  $\frac{2}{3} \sqrt{x^3} + 2\sqrt{x} + C$

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

Answer:  $\frac{1}{2} \sin^{-1}(x^2) + C$

# \_\_\_\_\_  
$$\int \frac{1}{x^2-4} dx$$

Answer:  $\frac{1}{2} \tan^{-1}(2x + 1) + C$

# \_\_\_\_\_  
$$\int \frac{2x+1}{x+2} dx$$

Answer:  $\frac{1}{2} \arcsin(2x) + C$

# \_\_\_\_\_  
$$\int \frac{x}{x+1} dx$$

Answer:  $\frac{-1}{2(2x+1)} + C$

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

Answer:  $-\frac{1}{4} \sqrt{1-4x^2} + C$

# \_\_\_\_\_

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

$$\text{Answer: } \frac{1}{4} \ln \left| \frac{x-2}{x+2} \right| + C$$

# \_\_\_\_\_

$$\int \frac{1}{x^2+2x+2} dx$$

$$\text{Answer: } x - \ln|x + 1| + C$$

# \_\_\_\_\_

$$\int \frac{x^2+1}{x^2} dx$$

$$\text{Answer: } \sqrt{x^2+4x} + C$$

# \_\_\_\_\_

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

$$\text{Answer: } \frac{1}{2} x^2 + 2x + 2 \ln|x + 1| + C$$

# \_\_\_\_\_

$$\int \frac{x+1}{\sqrt{x}} dx$$

$$\text{Answer: } 2x - 3 \ln|x + 2| + C$$