

# Math 222 In class assignment 4-Strategy for Integration

Name: \_\_\_\_\_

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Directions: Work in groups to complete the following problems.

1. Integrate:

(a)  $\int_0^1 (3x + 4)^{\sqrt{3}} dx$

(b)  $\int x \sec(x) \tan(x) dx$

(c)  $\int_1^4 \frac{2^{\sqrt{x}}}{\sqrt{x}} dx$

(d)  $\int \frac{1}{1 - \sin(x)} dx$

(e)  $\int \cos(\ln(x)) dx$  (Hint: use a substitution to first change the integral)

(f)  $\int \frac{\ln(x)}{x\sqrt{1 + (\ln(x))^2}} dx$

(g)  $\int \frac{\ln(x)}{x^4} dx$

(h)  $\int \frac{3x - 37}{x^2 - 3x - 4} dx$

(i)  $\int x\sqrt{2 - \sqrt{1 - x^2}} dx$

memorized since they are easily derived. Formula 19 can be avoided by using partial fractions, and trigonometric substitutions can be used in place of Formula 20.

**Table of Integration Formulas** Constants of integration have been omitted.

$$1. \int x^n dx = \frac{x^{n+1}}{n+1} \quad (n \neq -1)$$

$$2. \int \frac{1}{x} dx = \ln|x|$$

$$3. \int e^x dx = e^x$$

$$4. \int a^x dx = \frac{a^x}{\ln a}$$

$$5. \int \sin x dx = -\cos x$$

$$6. \int \cos x dx = \sin x$$

$$7. \int \sec^2 x dx = \tan x$$

$$8. \int \csc^2 x dx = -\cot x$$

$$9. \int \sec x \tan x dx = \sec x$$

$$10. \int \csc x \cot x dx = -\csc x$$

$$11. \int \sec x dx = \ln|\sec x + \tan x|$$

$$12. \int \csc x dx = \ln|\csc x - \cot x|$$

$$13. \int \tan x dx = \ln|\sec x|$$

$$14. \int \cot x dx = \ln|\sin x|$$

$$15. \int \sinh x dx = \cosh x$$

$$16. \int \cosh x dx = \sinh x$$

$$17. \int \frac{dx}{x^2 + a^2} = \frac{1}{a} \tan^{-1}\left(\frac{x}{a}\right)$$

$$18. \int \frac{dx}{\sqrt{a^2 - x^2}} = \sin^{-1}\left(\frac{x}{a}\right), \quad a > 0$$

$$*19. \int \frac{dx}{x^2 - a^2} = \frac{1}{2a} \ln \left| \frac{x-a}{x+a} \right|$$

$$*20. \int \frac{dx}{\sqrt{x^2 \pm a^2}} = \ln|x + \sqrt{x^2 \pm a^2}|$$