

## Math 212 RS2 Quiz 3A

February 11, 2020

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

Instructions: No calculators. Use your own scrap paper and write your answers in the space provided.

1. Complete the following rules:

(a)  $\int \frac{1}{\sqrt{1-x^2}} dx =$  \_\_\_\_\_ (b)  $\int \frac{1}{1+x^2} dx =$  \_\_\_\_\_

(c)  $\int \sec^3 x dx =$  \_\_\_\_\_ (d)  $\int \ln x dx =$  \_\_\_\_\_

(e)  $\int \tan x dx =$  \_\_\_\_\_ (f)  $\int \sec x dx =$  \_\_\_\_\_

2. Complete the following table of trig substitutions (the first row is an example):

Expression	Substitution	Identity
$a^2 - x^2$	$x = a \sin \theta$ or $x = a \cos \theta$	$1 - \sin^2 \theta = \cos^2 \theta$ or $1 - \cos^2 \theta = \sin^2 \theta$
$x^2 - a^2$		
	$x = a \tan \theta$	

3. Integrate the following:

(a)  $\int \sin^3 x \cos^4 x dx =$  \_\_\_\_\_ (b)  $\int \sin^2 x dx =$  \_\_\_\_\_

(c)  $\int \tan^5 \theta \sec^3 \theta d\theta =$  \_\_\_\_\_ (d)  $\int \frac{x^2}{\sqrt{1+x^2}} dx =$  \_\_\_\_\_

(e)  $\int \frac{\sin 2x}{1 + \cos^4 x} dx =$  \_\_\_\_\_ (f)  $\int x^2 \cos x dx =$  \_\_\_\_\_

**Bonus:**

1. (a)  $\int \frac{x^2 + 5}{x^2 + 1} dx =$  \_\_\_\_\_ (b)  $\int \frac{1}{x^2 + x - 2} dx =$  \_\_\_\_\_

2. Write down the partial fractions decomposition of  $\frac{3}{x^2(x^2+4)^2(x^2-16)}$ . You may use  $A, B, C, \dots$  for the arbitrary constants. You need not find the values of the arbitrary constants.

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