

Math 212 GH Quiz 5A

February 24, 2020

Name: _____

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

1. Suppose $\int_a^b f(x) dx$ is an integral in which $f(x)$ is a rational expression of trig functions.

(a) State the traditional Weierstrass substitution: $u =$ _____

(b) Using this substitution, derive or state $dx =$ _____ in terms of du

(c) Using this substitution, derive or state $\sin x =$ _____ as a function of u

(d) Using this substitution, derive or state $\cos x =$ _____ as a function of u

(e) Compute: $\int \frac{1}{\sin x + \tan x} dx =$ _____

2. Integrate the following:

(a) $\int \frac{3x}{(1+3x)^3} dx =$ _____ (b) $\int \frac{x^2 + 8x + 10}{x^2 + 2x + 4} dx =$ _____

(c) $\int \frac{4}{x^2 - 2x - 3} dx =$ _____

Bonus:

1. Consider the integral $\int_a^b f(x) dx$. What three things will make the integral improper?

(i) _____

(ii) _____

(iii) _____