

Quiz 2, Calculus 2

Dr. Adam Graham-Squire, Spring 2020

Name: _____

1. (7 points) For each of the integrals below, give a brief explanation of how you would approach it and why, given the different methods of integration that we now know (substitution, integration by parts, trigonometric substitution, partial fractions, improper integrals, etc). Some integrals may have multiple answers, and some may not be integrable with any of the methods we have learned (and thus you would need to use Maple to get an approximate integral)—if so, you should say that. Note: you do NOT have to integrate the functions! It may help to do a couple of the first steps, though, to see if your method works.

(a) $\int_0^2 \frac{x-2}{x^2-1} dx$

(b) $\int_0^{0.1} \frac{x}{\sqrt{1-4x^2}} dx$

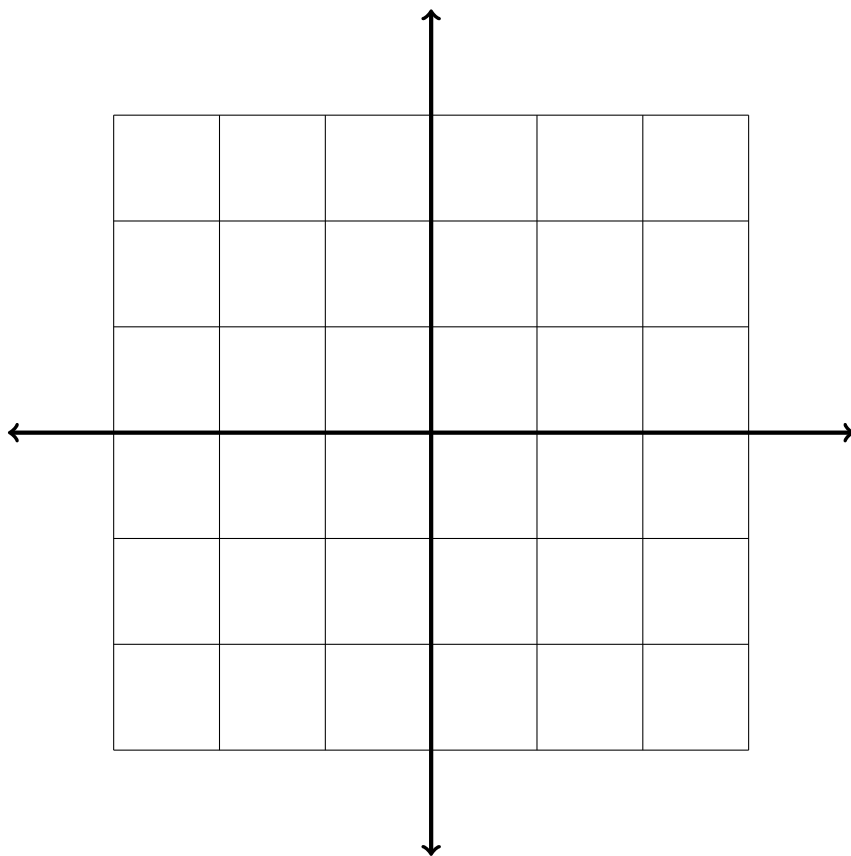
(c) $\int_0^2 \frac{1}{\sqrt{x^2+9}} dx$

$$(d) \int_0^2 e^{(x^3)} dx$$

$$(e) \int_0^2 \cos^5 x dx$$

$$(f) \int_1^2 x \ln(\sqrt{x}) dx$$

2. (3 points) Set up (but do not integrate) an integral to calculate the area completely enclosed by the functions $y = x^2$ and $y = x^3$. Sketch a graph of the area to help explain your integral:



Formulas

Trigonometric substitution:

- If we have a factor of the form $\sqrt{a^2 - x^2}$, we do the substitution $x = a \sin \theta$.
- If we have a factor of the form $\sqrt{a^2 + x^2}$, we do the substitution $x = a \tan \theta$.
- If we have a factor of the form $\sqrt{x^2 - a^2}$, we do the substitution $x = a \sec \theta$.

Half-angle formulas:

- $\sin^2 x = \frac{1}{2}(1 - \cos(2x))$
- $\cos^2 x = \frac{1}{2}(1 + \cos(2x))$

Error calculations:

Suppose $|f'''(x)| \leq K$ for all x between a and b . Then the error E_M for $\int_a^b f(x) dx$ using the Midpoint Rule is

$$|E_M| \leq \frac{K(b-a)^3}{24n^2}$$