**Review for Exam I**

MATH 2202 sec 51 Summer 2019

Sections Covered: 5.6, 7.1, 7.2, 7.3

These practice problems are intended to help you practice the specific skills associated with the topics to be tested over. **Nothing else is intended or implied.**

(1) Evaluate the given integrals.

(a) $\displaystyle\int \tan^3 \frac{x}{2} \sec^2 \frac{x}{2}\, dx$

(b) $\displaystyle\int_0^{\frac{\pi}{6}} \frac{\sin 2x}{\cos^4 2x}\, dx$

(c) $\displaystyle\int_1^4 \frac{dy}{2\sqrt{y}(1+\sqrt{y})^2}$

(d) $\displaystyle\int \frac{x^3}{\sqrt{x^4+1}}\, dx$

(e) $\displaystyle\int (\sec x - \csc(2x))\, dx$

(f) $\displaystyle\int \left(\frac{1}{\sqrt{1-x^2}} + \frac{2}{1+4x^2}\right) dx$

(g) $\displaystyle\int \frac{2x+1}{x^2+x+2}\, dx$

(2) Evaluate each integral using any applicable method.

(a) $\displaystyle\int x \sec^2 x\, dx$

(b) $\displaystyle\int 2xe^{x^2}\, dx$

(c) $\displaystyle\int 2xe^{x}\, dx$

(d) $\displaystyle\int \sin^2 \theta\, d\theta$

(e) $\displaystyle\int \tan^{-1} t\, dt$

(f) $\displaystyle\int \sec^4 x \tan x\, dx$

(g) $\displaystyle\int \cos^3 t \sin^2 t \, dt$

(h) $\displaystyle\int \sqrt{\cot x} \csc^2 x \, dx$

(3) Evaluate the integral by first using a substitution and then integration by parts.

$$\int e^{\sqrt{x}} \, dx$$

(4) Evaluate the given integrals using any applicable method.

(a) $\displaystyle\int \frac{\sqrt{x^2 - 9}}{x} \, dx$

(b) $\displaystyle\int \frac{dy}{\sqrt{16 - y^2}}$

(c) $\displaystyle\int \frac{x^3}{\sqrt{x^2 + 1}} \, dx$

(d) $\displaystyle\int_0^1 \sqrt{1 - x^2} \, dx$

(5) Find the area of the region bounded above by the graph of $y = \sec x$, below by the $x$-axis, and on the left and right by the lines $x = 0$ and $x = \frac{\pi}{4}$.

(6) Use the trigonometric identity $2 \sin A \sin B = \cos(A - B) - \cos(A + B)$ to evaluate the definite integral.

$$\int_0^{\pi/4} \sin(3x) \sin(x) \, dx$$

(7) Solve the initial value problem. (That is, find the function $y$ that satisfies both conditions given.)

$$\frac{dy}{dx} = x^2 e^{x^3}, \quad \text{and} \quad y(0) = 0$$