# MATH 152 Assignment 2, Fall 2019.

Michael Monagan

## Webassign exercises: Due 10pm Tuesday October 1st.

6.1 Exerises 8, 9, 11, 27, 53.

10.4 Exercises 5, 7, 10, 19.

6.2 Exercises 1, 5, 7.

6.5 Exercises 2, 9, 21.

7.1 Exercises 1, 3, 11, 19, 28, 39.
For 39, use a substitution then do integration by parts.
For 19 and 28 you need to apply integration by parts more than once.

7.2 Exercises 2, 10, 19, 41, 61.

## Written exercises: Due 10pm Wednesday October 2nd.

1 State the Fundamental Theorem of Calulus part (2).
Write it out and memorize it.

2 Let $f(x)$ and $g(x)$ be continuous on $[a,b]$. Apply the Fundamental Theorem of Calculus part (2) to show that

$$\int_a^b (f(x)+g(x))\,dx = \int_a^b f(x)dx + \int_a^b g(x)dx.$$

Hint: let $F(x)$ be an antiderivative of $f(x)$ and $G(x)$ be an antiderivative of $g(x)$.

3 Calculate $\int \cot x\,dx$. Use $\cot x = \frac{\cos x}{\sin x}$ and make a substitution.

4 Section 6.2 Exercise 47. This is the volume of a cone of radius $r$ and height $h$. All of the videos online that I watched just "give the formula" $V = \frac{1}{3}\pi r^2 h$ without any explanation.

5 Calculate the average of $f(x) = 1/x$ on $[1,3]$ and find a value $c$ on $[1,3]$ such that $f(c)$ is the average.

6 Prove the reduction formula $\int (\ln x)^n dx = x(\ln x)^n - n\int (\ln x)^{n-1} dx$ by differentation and then use it to calculate $\int (\ln x)^2 dx$. Now do Section 7.1 Exerise 65(b).

7 Calculate $\int x \sin x \cos x\,dx$.
Simplify the integrand then use integration by parts.

8 Show that $\int_0^{\pi/3} 8\sin^2(3\theta)d\theta = \frac{4}{3}\pi$. This is the area of one of the leafs of the 3 leaf rose given by $f(\theta) = 4\sin(3\theta)$ for $0 \le \theta \le \pi$.

9 Two functions $f(x)$ and $g(x)$ are said to be orthogonal on $[a,b]$ if $\int_a^b f(x)g(x)dx = 0$. Show that $\sin 2x$ and $\cos 3x$ are orthogonal on $[-\pi,\pi]$.

## Midterm 1 is on Friday October 4th at 8:30am.

It covers the material covered on Assignments 1 and 2.