MATH 152 Assignment 5, Fall 2022.

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Webassign Exercises

8.1 Exercises 1, 19

For exercise 19, you should find that the $\sqrt{1+f'(x)^2}$ simplifies to a rational function.

8.2 Exerises 7, 8

10.2 Exercises 3, 31, 41, 61

11.1 Exercises 5, 16, 23, 25, 38, 64, 75.

Written Exercises

1 (Section 8.1) Let $y = 1/x$ so that $dy/dx = -1/x^2$. The length L of $1/x$ on $[1,2]$ is given by $\int_1^2 \sqrt{1+\frac{1}{x^4}}dx$. There is no elementary antiderivative for this integral. Use Simpson's rule with $n = 6$ to approximate L. You should get close to 1.13209.

2 (Section 8.1) A hawk flying at 15 m/s at a height of 180 m accidentally drops its prey. The parabolic trajectory of the falling prey is given by the equation $y = 180 - x^2/45$ where y is the height above the ground and x is the horizontal distance travelled in m. Calculate the distance travelled by the prey until it hits the ground. Show your working. You should get 209.1 m. Formula 21 in the Table of Integrals at the back of the text should be helpful.

3 Section 8.2 exercise 15.

4 (Section 8.2) Find the surface area of a sphere of radius r by

(a) rotating $y = \sqrt{r^2 - x^2}$ about the x-axis and

(b) rotating $y = \sqrt{r^2 - x^2}$ about the y-axis.

5 (Section 10.2) Consider the parametric curve $x = t^3 + 1, y = 2t - t^2$. Sketch the curve for $0 \le t \le 2$. For what value of t is $\frac{dy}{dx} = 0$. Identify the point in your sketch. Calculate the area between $y(x)$ and the x axis.

6 Section 11.1 exercise 76.

7 (Section 11.1) Let $a_n = r^n$ for $0 < r < 1$. Use Definition 2 on page 696 to show that $\lim_{n\to\infty} a_n = 0$. I often find it helpful to try an example first before trying to prove a general result. Take $r = 0.5$ and $\epsilon = 0.001$ and try to find the N in Definition 2.