MAT 1505 (Dr. Fuentes) **Worksheet 8 - Section 8.1**

Section 8.1: Arc Length

Problem 1. Find the exact length of the curve for the given range.

(a) $x = e^y + \frac{1}{4}e^{-y}$, $0 \le y \le 1$, (b) $f(x) = \frac{x^3}{6} + \frac{1}{2x}$, $1 \le x \le 2$, (c) $x^2 - 4y = 2\ln(x)$, $1 \le x \le 2$.

Problem 2. Find the arc length function for the curve $y = \arcsin(x) + \sqrt{1-x^2}$ with starting point $(0, 1)$.

Problem 3. A hawk flying at $15\,m/s$ at an altitude of $180\,m$ accidentally drops its prey. The parabolic trajectory of the falling prey is described by the equation

$$y = 180 - \frac{x^2}{45}$$

until it hits the ground, where **y is its height above the ground and x is the horizontal distance traveled in meters.**

Calculate the distance traveled by the prey from the time it is dropped until the time it hits the ground. Express your answer correct to the nearest tenth of a meter.

**For Problem 3 you will need the following integration formula, which would be provided on quizzes/exams:

$$\int \sec^3(u)\,du = \frac{1}{2}\sec(u)\tan(u) + \frac{1}{2}\ln(|\sec(u) + \tan(u)|) + C.$$

****You will also need the integral formula above for Problem 10 in the WebAssign homework assignment for Section 8.1.**