

Professor Rejto, Secs; 51,52,53,54.

Calculators and open books are not allowed. All work must be self-contained and shown in your blue book(s)! Note that some of the problems are similar but not identical to some of the Home Work problems.

1. (30 pts.) Find a rationalizing substitution for the integral:

$$\int \frac{\sqrt{x}}{x-4} dx.$$

Important: there is no need to evaluate the resulting integral.

2. (30 pts.)

(a) (15 pts.) Let L denote the arclength of the curve $y = f(x)$, $a \leq x \leq b$. Find a formula for L .

(b) (15 pts.) Set up, but do not evaluate, an integral for the length of the curve

$$\frac{x^2}{2^2} + \frac{y^2}{3^2} = 1.$$

3. (30 pts.) Set up, but do not evaluate, an integral for the area of the surface obtained by rotating the curve,

$$y(x) = e^x, 2 \leq y \leq 3,$$

around the y -axis.

4. (30 pts.)

(a) (15 pts.) Find a solution to the differential equation:

$$y'(x) = 3y(x).$$

(b) (15 pts.) Find two solutions to the differential equation:

$$y''(x) - 2y'(x) - 4y(x) = 0.$$

Hint: Assume that $y(x) = e^{rx}$ and find an equation for r .

5. (30 pts.) Find an equation to the tangent to the curve,

$$x(t) = 10 \cos t, \quad y(t) = 10 \sin t,$$

at the point $(6, 8)$.