

## Lab 10

### Net Change, the Substitution Method, and Transcendental Functions

1. On a typical day, a city consumes water at the rate of  $r(t) = 100 + 72t - 3t^2$  (in thousands of gallons per hour), where  $t$  is the number of hours past midnight.
  - (a) What is the daily water consumption?
  - (b) How much water is consumed between 6 pm and midnight?
2. Evaluate the integral.

(a)  $\int \frac{(2x^3 + 3x)}{(3x^4 + 9x^2)^5} dx$

(b)  $\int_0^5 15x\sqrt{x+4} dx$

(c)  $\int t^2 \sec^2(9t^3 + 1) dt$

(d)  $\int \frac{dt}{t(1 + (\ln t)^2)}$

(e)  $\int_4^{12} \frac{dx}{x\sqrt{x^2 - 1}}$

(f)  $\int \frac{x dx}{\sqrt{1 - x^4}}$

(g)  $\int_0^1 \frac{(\tan^{-1} x)^3 dx}{1 + x^2}$

(h)  $\int e^x 10^x dx$

(i)  $\int_0^{\pi/6} \sin x \cos^4 x dx$

(j)  $\int_0^{\pi/3} \frac{\sin \theta}{\cos^{2/3} \theta} d\theta$

(k)  $\int x^2 e^{x^3} dx$

(l)  $\int \frac{dx}{4x^2 + 9}$