

## Review Questions 3

## Summation, Definite integrals and the FTC

1. Compute the following **definite** integrals. Use the *Fundamental Theorem of Calculus*, (i.e. don't use limits of right-hand sums).

a.  $\int_0^4 \frac{3x \, dx}{\sqrt[3]{x^2 + 1}} =$

d.  $\int_0^{10} 1000e^{-0.05t} \, dt =$

b.  $\int_1^3 (x^2 + 2x)(x^3 + 3x^2 - 1)^3 \, dx =$

e.  $\int_0^1 \frac{x}{x^2 + 1} \, dx =$

c.  $\int_e^{e^2} \frac{dx}{x \ln x} =$

f.  $\int_0^2 \frac{e^x - e^{-x}}{e^x + e^{-x}} \, dx =$

2. Compute ...

a.  $\sum_{k=10}^{20} 2k + 1 =$

b.  $\sum_{i=0}^{100} i^2 + 3i - 4 =$

c.  $\sum_{m=1}^{100} me^{-0.05m} =$

See problem 7. on the homework from SN 1.

3. The marginal propensity to consume of a small nation is given by

$$\frac{dC}{dY} = \frac{8Y + 13}{9Y + 21},$$

where consumption  $C$  and income  $Y$  are both measured in billions of dollars. By how much will consumption increase if income increases from \$10 billion to \$15 billion? By how much will the nation's savings increase?

4. A firm's marginal revenue function is  $\frac{dr}{dq} = q\sqrt{1000 - 0.1q^2}$ . Suppose that the firm's output increases from  $q = 40$  to  $q = 50$ . Express the total change in the firm's revenue as a definite integral and compute it.