Study Guide 2

Indefinite Integration and Applications

1. Compute the indefinite integrals below.

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

c. $\displaystyle\int 1000 e^{-0.05t}\,dt =$

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

d. $\displaystyle\int \frac{t^2+5}{3t+1}\,dt$

2. Find the function $y = g(x)$, given that $y'' = x^2 - 1$, $g'(1) = 2$ and $g(1) = 2$.

3. A firm's marginal revenue and marginal cost functions are

$$\frac{dr}{dq} = 100 - \sqrt{3q+10} \quad \text{and} \quad \frac{dc}{dq} = 0.2q + 65,$$

respectively. How will the firm's **profit** change if output is increased from $q = 30$ to $q = 53$?

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

$$\frac{dC}{dY} = \frac{9Y+10}{10Y+1},$$

where consumption C and national income Y are both measured in billions of dollars. Find the total change in national consumption and saving, if income increases from \$10 billion to \$15 billion.