Key

Math106, Quiz # 8 30

1. **Name:** **ID #:** **(Show your work)**

Q1. Find Δy and differential dy of $y = x^2 + 3x - 3$ when $x = 1$ and $\Delta x = 0.05$. (10)

$$\Delta y = f(x + \Delta x) - f(x)$$

$$\Delta y = f(1,05) - f(1)$$

$$[(1,05)^2 + 3(1,05) - 3] - [(1)^2 + 3(1) - 3]$$

$$[1,1025 + 3,15 - 3] - [1 + 3 - 3]$$

$$4,2525 - 3 - 1$$

$$\Delta y = 0,2525$$ ✓

$$dy = f'(x) \cdot dx$$

$$dy = (2x + 3) \cdot 0,05$$

$$dy = (2(1) + 3) \cdot 0,05$$

$$dy \approx 5 \cdot 0,05$$

$$dy = 0,25$$ ✓

Q2. If $y' = x^2(x + 1)$ with $y(2) = 8/3$, then find $y(x)$. Hint: first find $\int x^2(x + 1)dx$.

$$y' = x^3 + x^2$$

$$y(2) = \frac{8}{3}$$

$$y = \frac{x^4}{4} + \frac{x^3}{3} + C$$

$$y(2) = \frac{(2)^4}{4} + \frac{(2)^3}{3} + C = \frac{8}{3}$$

$$\frac{16}{4} + \frac{8}{3}$$

$$\frac{4}{1} + \frac{8}{3} + C = \frac{8}{3}$$

$$\frac{12}{3} + \frac{8}{3}$$

$$\frac{20}{3} + C = \frac{8}{3}$$

$$C = \frac{8}{3} - \frac{20}{3}$$

$$C = -\frac{12}{3} = -4$$

$$y(x) = \frac{x^4}{4} + \frac{x^3}{3} - 4$$