

Quiz 5

Name: Key Row: \_\_\_\_\_

[6]

1. If  $f'(x) = 8x + 3$  and  $f(2) = 30$ , find  $f(x)$ .

$$f(x) = \int (8x + 3) dx = 8 \int x dx + \int 3 dx \quad (2) \quad (1)$$

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

$$f(2) = 30 \Rightarrow 4 \cdot 2^2 + 3 \cdot 2 + C = 30 \Rightarrow 16 + 6 + C = 30 \Rightarrow C = 8 \quad (2)$$

So  $f(x) = 4x^2 + 3x + 8$  (1)

[4]

2. Find  $\frac{d}{dx} \int_0^x \frac{1}{\sqrt{t^4+1}} dt$ .

"  $\frac{1}{\sqrt{x^4+1}}$  (by Fundamental Th. of Calculus part (1))

3. Evaluate the integrals:

[4]

a.  $\int_1^4 \sqrt{x} dx$

$$= \int_1^4 x^{1/2} dx = \left[ \frac{2}{3} x^{3/2} \right]_1^4 = \frac{2}{3} (4^{3/2} - 1^{3/2})$$

$$= \frac{2}{3} (8 - 1) = \frac{14}{3}$$

[6]

b.  $\int_0^1 (x^3 + 1)^2 dx = \int_0^1 (x^3 \cdot x^3 + 2 \cdot x^3 + 1) dx$

$$= \int_0^1 (x^6 + 2x^3 + 1) dx$$

$$= \left[ \frac{x^7}{7} + \frac{2x^4}{4} + x \right]_0^1 = \frac{1}{7} + \frac{2}{4} + 1 = \frac{2}{14} + \frac{7}{14} + \frac{14}{14}$$

$$= \frac{23}{14}$$