Allen – Math 160 A Quiz #9 Name: Key

1. Recover $f(x)$ given that $f'(x) = 2x - 3$ and $f(0) = 4$.

$$f(x) = \int (2x-3)\,dx = x^2 - 3x + C. \quad +3$$

$$f(0) = 4 \Rightarrow 0^2 - 3(0) + C = 4 \Rightarrow C = 4. \quad +2$$

5 Thus $\boxed{f(x) = x^2 - 3x + 4}$

2. Determine the indefinite integral $\int \left( \frac{3}{x^3} + 2x^{3/2} - 4 \right) dx$.

$$\int (3x^{-3} + 2x^{3/2} - 4)\,dx = 3 \cdot \left(\frac{x^{-2}}{-2}\right) + 2\left(\frac{x^{5/2}}{5/2}\right) - 4x + C \quad +4$$

7

$$= \frac{-3}{2}x^{-2} + 2 \cdot x^{5/2} \cdot \frac{2}{5} - 4x + C \quad +2$$

$$= \boxed{\frac{-3}{2x^2} + \frac{4}{5}x^{5/2} - 4x + C} \quad +1$$

3. Calculate by hand the left sum to approximate the area under the graph of $f(x) = 2x - 1$ on the interval $[3, 5]$. Do this by dividing $[3, 5]$ equally into 4 subintervals.

$$\Delta x = \frac{5-3}{4} = \frac{1}{2} \quad +1$$

8

3 3.5 4 4.5 5

$x_0 = 3$

$x_1 = 3.5 = 7/2$

$x_2 = 4$

$x_3 = 4.5 = 9/2$

$x_4 = 5$. +3

$$A \approx \Delta x \left( f(x_0) + f(x_1) + f(x_2) + f(x_3) \right)$$

$$= \frac{1}{2}\left( f(3) + f(7/2) + f(4) + f(9/2) \right)$$

$$= \frac{1}{2}(5 + 6 + 7 + 8) = \frac{1}{2}(26) = \boxed{13} \quad +4$$