

**Quiz 1**  
Math 111

Name:

ID:

1. Find the most general antiderivative of the function [2 marks]

$$f(x) = \frac{x^{\frac{1}{3}} - 3}{x^{\frac{2}{3}}}$$

$$\begin{aligned} F(x) &= \int \frac{x^{\frac{1}{3}} - 3}{x^{\frac{2}{3}}} dx \\ &= \int x^{-\frac{1}{3}} - 3x^{-\frac{2}{3}} dx \\ &= \int x^{-\frac{1}{3}} dx - 3 \int x^{-\frac{2}{3}} dx \\ &= \frac{x^{-\frac{1}{3}+1}}{-\frac{1}{3}+1} - 3 \frac{x^{-\frac{2}{3}+1}}{-\frac{2}{3}+1} + c \\ &= \frac{3}{2} x^{\frac{2}{3}} - 9x^{\frac{1}{3}} + c \end{aligned}$$

2. Evaluate the integral [1 mark]

$$\begin{aligned} \int \left( \frac{3}{t} + 5 \sec^2 t \right) dt &= 3 \int \frac{1}{t} dt + 5 \int \sec^2 t dt \\ &= 3 \ln |t| + 5 \tan t + c \end{aligned}$$

3. Use the summation rules to compute  $\sum_{j=1}^{100} j(6j-2)$

$$\begin{aligned} \sum_{j=1}^{100} j(6j-2) &= \sum_{j=1}^{100} (6j^2 - 2j) \\ &= 6 \sum_{j=1}^{100} j^2 - 2 \sum_{j=1}^{100} j \\ &= 6 \frac{(100)(101)(201)}{6} - 2 \frac{(100)(101)}{2} \\ &= (100)(101)[201-1] \\ &= (100)(101)(200) \\ &= 2020000 \end{aligned}$$