

Quiz 1
Math 111

Name:

ID:

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

$$f(x) = x^{\frac{1}{4}} \left(x^{\frac{5}{4}} - 4 \right).$$

$$\begin{aligned} F(x) &= \int x^{\frac{1}{4}} \left(x^{\frac{5}{4}} - 4 \right) dx \\ &= \int x^{\frac{6}{4}} - 4x^{\frac{1}{4}} dx \\ &= \int x^{\frac{3}{2}} dx - 4 \int x^{\frac{1}{4}} dx \\ &= \frac{x^{\frac{3}{2}+1}}{\frac{3}{2}+1} - 4 \frac{x^{\frac{1}{4}+1}}{\frac{1}{4}+1} + c \\ &= \frac{2}{5} x^{\frac{5}{2}} - \frac{16}{5} x^{\frac{5}{4}} + c \end{aligned}$$

2. Evaluate the integral [1 mark]

$$\begin{aligned} \int (8 \cos t - 4e^{-t}) dt &= 8 \int \cos t dt - 4 \int e^{-t} dt \\ &= 8 \sin t - 4(-e^{-t}) + c \\ &= 8 \sin t + 4e^{-t} + c \end{aligned}$$

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

$$\begin{aligned} \sum_{k=1}^{100} (6k^2 - 2k) &= 6 \sum_{k=1}^{100} k^2 - 2 \sum_{k=1}^{100} k \\ &= 6 \frac{(100)(101)(201)}{6} - 2 \frac{(100)(101)}{2} \\ &= (100)(101)[201 - 1] \\ &= (100)(101)(200) \\ &= 2020\,000 \end{aligned}$$