

1M01 Mathematical Methods 2010–11

Calculus tutorial exercise sheet 3

1. (a) Find $\frac{d}{dx}(5x^4 - 2x + 3)$

Notes: 22–25

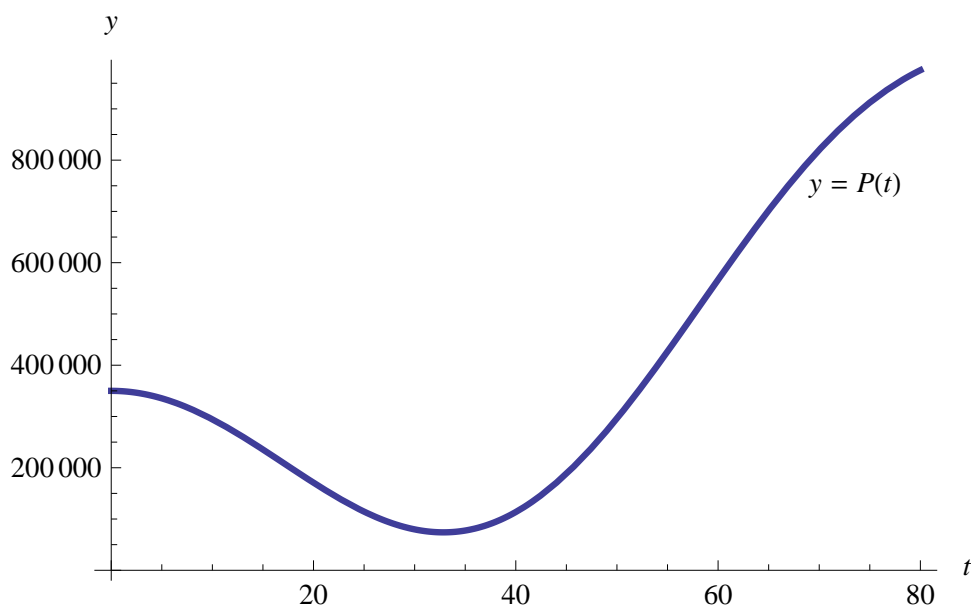
(b) If $P(t) = 400t^4 + 3000$, what is $P'(2)$?

(c) If $y = x(x - 1)^2$, find $\left. \frac{dy}{dx} \right|_{x=1}$.

(d) Compute the slope of the tangent line to $y = x^2 + 5x - 1$ at $x = 4$.

2. An antibacterial agent is introduced to a population of bacteria in a Petri dish at the start of an experiment. The following graph represents the number of bacteria $P(t)$ in the dish, t hours after the start of the experiment. Estimate the growth rate of the bacterial population 50 hours after the start of the experiment. [Some of your working should appear on the graph, so hand in this sheet with the rest of your work].

Notes: 22, 38



3. Compute:

Notes: 26–29

(a) $\int \frac{1}{2}x^3 - 4 dx$ (b) $\int 7(t - 4)^2 dt$ (c) $\int \frac{3x^2 + 5}{4} dx$

4. (a) Compute $\int_{-1}^2 x dx$. (b) What is $\int_0^1 x^2(x - 3) dx$?

Notes: 32–33