

Math 181 Quiz 12

Evaluate the following derivatives.

① $\frac{d}{dx} \ln(3 + \cos 2x)$

② $\frac{d}{dx} \int_{x^2}^{x^3} \frac{e^{-t^2}}{2 + \cos t} dt$

③ $\frac{d}{dx} (1 + x^2)^{\sin x}$

The mean value theorem states: Assume f is continuous everywhere on a closed interval $[a, b]$ and has a derivative at each point of the open interval (a, b) . Then there is at least one point $c \in (a, b)$ for which $f(b) - f(a) = f'(c)(b - a)$.

④ Use the mean value theorem to prove: If $f'(x) = 0$ for each x in an open interval I , then f is constant on I .

⑤ Use the result in problem 4 to show: If P and Q are primitives or antiderivatives of the same function on an open interval I , then there is a constant K such that $P(x) = Q(x) + K$ for all x in I .