

APPLICATIONS TO MODELLING

Example 4

The price of a car in £s, x years after purchase, is modelled by the function

$$f(x) = 15\,000(0.85)^x - 1000 \sin x, \quad x > 0$$

- (a) Use the model to find the value, to the nearest hundred £s, of the car 10 years after purchase.
- (b) Show that $f(x)$ has a root between 19 and 20.
- (c) Find $f'(x)$
- (d) Taking 19.5 as a first approximation, apply the Newton-Raphson method once to $f(x)$ to obtain a second approximation for the time when the value of the car is zero. Give your answer to 3 decimal places.
- (e) Criticise this model with respect to the value of the car as it gets older.