

**Problem statement** The linear approximation for the function  $f(x) = x^5$  near  $x = 2$  is  $32 + 80(x - 2)$ . (You should check this!)

a) What number  $a$  will give the best quadratic approximation  $x^5 \approx 32 + 80(x - 2) + a(x - 2)^2$  near  $x = 2$ ?

b) If this approximation is used for various  $x$ 's in the interval  $[2, 2.1]$ , can you be certain that the error is no bigger than .05? Explain, using Taylor's inequality (the **Error Bound**).

c) Graph  $x^5 - (32 + 80(x - 2) + a(x - 2)^2)$  (using the value of  $a$  previously found) in the interval  $[2, 2.1]$ .