

- (25) 1. Finite precision arithmetic.
- (a) Let  $a = 0.0079346$  and  $b = 42.0963$ . Compute the 2 (decimal) digit rounding representations of  $a$  and  $b$ , call them  $\bar{a}$  and  $\bar{b}$  respectively.
- $\bar{a} =$
  - $\bar{b} =$
  - What is the machine precision,  $\mu$ , for this arithmetic?
- (b) What do we mean by underflow?
- (c) What is digit cancellation?
- (15) 2. Let  $x$  and  $y$  be real numbers such that none of  $x$ ,  $y$  nor  $xy$  underflow nor overflow. Derive an upper bound on the relative error in computing the floating point product of  $x$  and  $y$ .



(30) 4. Let  $f(x) = e^{2x} \cos(x)$ .

(a) State the Taylor polynomial theorem in its general form.

(b) Compute  $P_2(x)$ , the degree 2 Taylor polynomial for  $f$  at  $x_0 = 0$ .

(c) Use  $P_2$  to approximate  $f(0.25)$ .

(d) What is the remainder term associated with  $P_2$  at  $x = 0.25$ ?