

This page contains short answer questions. No explanations are required.

1. (12 points) .

(a) Compute the 25th derivative,  $f^{(25)}$ , of the function  $f$  given by

(i)  $f(x) = 10x^9 + 14x^7 - 12x^6 + 2x^5 + 3x^4 - 2x^2 + 5x - 4$

$$f^{(25)}(x) = \underline{\hspace{10em} 0 \hspace{10em}}$$

(ii)  $f(x) = \sin(2x)$

$$f^{(25)}(x) = \underline{2^{25} \cos(2x)}$$

(b) For what value of  $a$  is  $\lim_{h \rightarrow 0} (a^h - 1)/h$  equal to 1?

$$a = \underline{e}$$

(c) For the function  $f(x) = (1.2)^{3x}$ , find

(i)  $f'(2/3) = \underline{3 \ln(1.2) (1.2)^2}$  ( $\approx .787629\dots$ )

(ii)  $[f(2/3)]' = \underline{0}$

2. (8 pts) The function  $f$  is an increasing function that is concave down. Fill in each of the blanks with one of the symbols,  $<$ ,  $=$ ,  $>$  so that the following statements about  $f$  are always true.

(i)  $f(2) \underline{<} f(4)$

(ii)  $f'(2) \underline{>} f'(4)$

(iii)  $f''(2) \underline{<} 0$

(iv)  $f(3 + \Delta x) \underline{<} f(3) + f'(3)\Delta x$