

Chapter 4: Practice/review problems

The collection of problems listed below contains questions taken from previous MA123 exams.

Computing some derivatives

[1]. If $f(x) = (x + 3)^2$ then $\frac{f(x+h) - f(x)}{h} =$

- (a) $2x + h$ (b) $2x + 3 + h$ (c) $2(x + 3) + h$
 (d) $2(x + 3)$ (e) $2x + 8 + h$

[2]. If $f(x) = (x + 6)^2$, find

$$\frac{f(x+h) - f(x)}{h}$$

- (a) $2x + 2h + 12$ (b) $2x + h - 2$ (c) $2x + 2h + 2$
 (d) $2x + h + 12$ (e) $2x + h - 12$

[3]. If $F(t) = \frac{3}{t+1}$ then the slope of the tangent line to the graph of $F(t)$ at $t = 2$ is

- (a) $-1/3$ (b) $-1/2$ (c) 0 (d) $1/3$ (e) $1/2$

[4]. Suppose that $f(x) = \frac{2}{x+3}$. Find $\frac{f(x+h) - f(x)}{h}$.

- (a) $\frac{-2}{(x+3)^2}$ (b) $\frac{-2}{h(x+3)^2}$ (c) $\frac{2}{(x+h+3)(x+3)}$
 (d) $\frac{-2}{(x+h+3)(x+3)}$ (e) $\frac{2}{(x+3)^2}$

[5]. Evaluate the limit

$$\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h}$$

where

$$f(x) = \sqrt{x+1}$$

- (a) $1/6$ (b) $1/5$ (c) $1/4$ (d) $1/3$ (e) $1/2$

[6]. If $F(s) = \sqrt{2s+2}$, find $F'(1)$.

- (a) $\frac{1}{2}$ (b) $\frac{1}{2\sqrt{2}}$ (c) $\frac{1}{\sqrt{2}}$ (d) $\frac{3}{2\sqrt{2}}$ (e) $\frac{3}{2}$

[7]. The equation of the tangent line to the graph of $w = \sqrt{t+1}$ at $t = 3$ is

- (a) $w = 2 + (1/3)(t - 3)$ (b) $w = 2 + (1/4)(t - 3)$ (c) $w = 3 + (1/4)(t - 3)$
(d) $w = 3 + (1/6)(t - 8)$ (e) $w = 3 + (1/3)(t - 8)$

Approximating some derivatives

[8]. Suppose $f(x) = 2^x$. Use the definition of the derivative and a calculator to find the approximate value of the derivative of f at $x = .4$. Select the answer that best approximates the derivative.

- (a) .43 (b) .53 (c) .63 (d) .93 (e) 1.13

[9]. Suppose $f(x) = \log(x)$ where $\log(x)$ denotes the base 10 logarithm. Use the definition of the derivative and a calculator to find the approximate value of the derivative of f at $x = 2$. Select the answer that best approximates the derivative.

- (a) .102 (b) .145 (c) .180 (d) .217 (e) .378

[10]. Let $f(x) = 2^x$.

Use a calculator and the definition of the derivative as a limit to estimate the value of $f'(1)$.

- (a) 1.386 (b) 2.296 (c) 4.768 (d) 5.545 (e) 8.047

[11]. Let $f(x) = \ln(x + 2) + 1$. Use the limit definition of the derivative and a calculator to estimate $f'(4)$. Your answer should be correct to four decimal places.

- (a) 0.1667 (b) 0.2500 (c) 0.1429 (d) 0.2000 (e) 1.0000