`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 $\dfrac{f(x+h)-f(x)}{h} =$

(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 $F(t) = \dfrac{3}{t+1}$ 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 $f(x) = \dfrac{2}{x+3}$. Find $\dfrac{f(x+h)-f(x)}{h}$.

(a) $\dfrac{-2}{(x+3)^2}$ **(b)** $\dfrac{-2}{h(x+3)^2}$ **(c)** $\dfrac{2}{(x+h+3)(x+3)}$

(d) $\dfrac{-2}{(x+h+3)(x+3)}$ **(e)** $\dfrac{2}{(x+3)^2}$

[5]. Evaluate the limit

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

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) $\dfrac{1}{2}$ **(b)** $\dfrac{1}{2\sqrt{2}}$ **(c)** $\dfrac{1}{\sqrt{2}}$ **(d)** $\dfrac{3}{2\sqrt{2}}$ **(e)** $\dfrac{3}{2}$

[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 (optional)

[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