

Mathematics 012A
Test 1, October 13, 2006
Solutions

Part A	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Answers	B	B	E	B	C	A	D	E	C	B	A	D	D	E	D	B	D

Part B

B1. a) -1 b) -1 c) 1 d) No because (two sided) limit DNE.

$$\begin{aligned} \text{B2. } f'(4) &= \lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4} \cdot \frac{\sqrt{x} + 2}{\sqrt{x} + 2} = \lim_{x \rightarrow 4} \frac{x - 4}{x - 4} \cdot \frac{1}{\sqrt{x} + 2} \\ &= \lim_{x \rightarrow 4} \frac{1}{\sqrt{x} + 2} = \frac{1}{4} \end{aligned}$$

$$\begin{aligned} \text{B3. } f'(2) &= \lim_{h \rightarrow 0} \frac{(2+h)^2 + (2+h) - (2^2 + 2)}{h} \\ &= \lim_{h \rightarrow 0} \frac{4 + 4h + h^2 + 2 + h - 6}{h} = \lim_{h \rightarrow 0} \frac{5h + h^2}{h} \\ &= \lim_{h \rightarrow 0} 5 + h = 5 \end{aligned}$$

$$\text{B4. a) } 10 - x^{-4} \quad \text{b) } \left(\frac{1}{2}x^{-1/2} + 2x\right)(x^3 - x^{1/3}) + (x^{1/2} + x^2)\left(3x^2 - \frac{1}{3}x^{-2/3}\right)$$

$$\text{c) } \frac{-2x(1+x^2) - (1-x^2)(2x)}{(1+x^2)^2} \quad \text{d) } 4\left(\frac{x}{1+x^3}\right)^3 \left(\frac{(1+x^3) - x(3x^2)}{(1+x^3)^2}\right)$$

$$\begin{aligned} \text{B5. } y' &= -4x^{-3}, \\ m &= y'(1) = -4, \\ \text{So } y - 2 &= -4(x - 1) \\ \text{and } y &= -4x + 6 \end{aligned}$$