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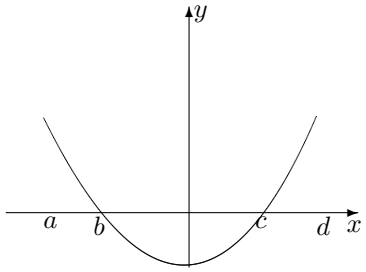
Test 1
(short practice version)

Cal I (S) (Maths 201–NYA)

Answers



1. (a) $\lim_{h\to 0} \frac{\frac{2}{4-(x+h)} - \frac{2}{4-x}}{h} = \frac{2}{(4-x)^2}$

   (b) $\lim_{h\to 0} \frac{\sqrt{1+2(x+h)} - \sqrt{1+2x}}{h} = \frac{1}{\sqrt{1+2x}}$

2. The graph looks like a U-shaped parabola with x-intercepts at b and c.

3. (a) $64x^3 - \frac{28}{21}x^6 - \frac{8}{3}x^{-5}$

   (b) $(3x^2-2)\sqrt{5x^7-6x+\frac{1}{x}} + (x^3-2x)\frac{1}{2}(5x^7-6x+\frac{1}{x})^{-1/2}(35x^6-6-\frac{1}{x^2})$

   (c) $\frac{1}{3}(5x^2-3x+8)^5(10x-3)$

   (d) $\mathrm{e}^{x^3+2x}(3x^2+2)(5x^4-\sqrt[3]{x+1})^4 + \mathrm{e}^{x^3+2x}\,4(5x^4-\sqrt[3]{x+1})^3(20x^3-\frac{1}{3}(x+1)^{-2/3})$

4. (I've done some with log diff, some without. Ask if you want to verify your answer. But note that 4(e) *needs* log diff.)

   (a) $y' = \frac{9(7x^4-6x+\mathrm{e}^2)^8(28x^3-6)\sqrt[5]{3x^7-\frac{2}{x}-2} \;-\; (7x^4-6x+\mathrm{e}^2)^9(\frac{1}{5})(3x^7-\frac{2}{x}-2)^{-4/5}(21x^6+\frac{2}{x^2})}{(3x^7-\frac{2}{x}-2)^{2/5}}$

   (b) $y' = 3\sec^2(x^2-x)\sec(x^2-x)\tan(x^2-x)(2x-1)\cos^2(5x^4-5) \;-\; \sec^3(x^2-x)2\cos(5x^4-5)\sin(5x^4-5)(20x^3)$

   (c) $y' = \left[\frac{\mathrm{e}^{x^2+1}\sin(2x)}{\sqrt[4]{7x+3}}\right]\left[2x + \frac{2\cos(2x)}{\sin(2x)} - \frac{1}{4}\frac{7}{7x+3}\right]$

   (d) $y' = -4\cot^3(\sqrt{x^4-7x^6+17x})(\csc^2(\sqrt{x^4-7x^6+17x})\frac{1}{2}(x^4-7x^6+17x)^{-1/2}(4x^3-42x^5+17)$

   (e) $y' = (\ln x)^{x^2+1}\left[2x\ln(\ln x) + \frac{x^2+1}{x\ln x}\right]$

5. $y' = \frac{1}{3}, y'' = \frac{103}{27}$

6. Slope $= \frac{1}{3}$; Equation: $y = \frac{1}{3}x + \frac{2}{3}$.

7. slope $= -3$. Equation: $y = -3x + 7$.

8. $x = 2$ or -3

9. $v = 5 + 6t$; $v(2) = 17$ m/s, $v_0 = 5$m/s; $t = 5$s

P.S. Let me know if you find (or suspect) any errors!