Mathematics for Political Science

Exercise 2 Solutions: Calculus

August 19ᵗʰ, 2020

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1. (a) -4
   (b) -5
   (c) 1.6
   (d) 2

2. (a) 9
   (b) 3
   (c) 1

3.

   a. $x^{-\frac{2}{3}}$ b. 14 c. $3y^2 + 6y$

   d. $5x^4 + 3x^2 - 2x$ e. $1 + 3y^2 + \frac{14}{y^3}$ f. $2y + y^{-2} - 3y^{-4}$

   g. $\frac{12x^2 - 8x + 16}{x^4 - 8x^3 + 16x^2}$ h. $e^{y^2 - 3y + 2}(2y - 3)$ i. $\frac{2}{x}$

4. $4(8(x^4 + 2) - 1) * 8 * 4x^3$

5.

$$f(x) = 3x^2 - 7x + 2 \qquad g(x) = 8x^3 - 46x^2 + 73x - 35$$

   - $f(x)$: minimum at $x = \frac{7}{6}$
   - $g(x)$: maximum at $x = \frac{23 - \sqrt{91}}{12}$, minimum at $x = \frac{23 + \sqrt{91}}{12}$

6. (a) $0 = \frac{2}{x} + 1 - \frac{2}{2x+1}$
   (b) $-2x^2 + x + 2 = 0$
   (c) Zeroes at approximately -.78 and 1.28.

7.
   - $\frac{\partial(.)}{\partial e} = h(eR(\frac{f}{f+g}))^{h-1}R\frac{f}{f+g}$
   - $\frac{\partial(.)}{\partial f} = h(eR(\frac{f}{f+g}))^{h-1}eR\frac{g}{(f+g)^2}$

8.

   a. $y^4 + C$ b. $\frac{1}{3}x^3 - 2x^{\frac{1}{2}} + C$ c. $\frac{360}{7}t^7 + C$

9.
a. 700

b. $\frac{531440}{3}$

c. 0

d. $28\frac{2}{3}$

e. $e^4 - e^2$

f. $\frac{16}{3} - \frac{4}{3}\sqrt{2}$

10. $2306\frac{2}{3}$