Universidad Autónoma de Coahuila

Facultad de Ingeniería Mecánica y Eléctrica

Unidad Torreón

Subject	Practical optimization	Group	2
Degree	Masters in clean energy	Due for	09/09/2019
Exam / Homework	Homework 1: Preliminaries to the course	Registration #	
Professor's name	Suresh Kumar Gadi	Marks Obtained	_____ / 10
Student's name			

Instructions

1. The student should submit the homework on or before the due date. (LATE SUBMISSION = 0 MARKS)
2. Answers should be hand written on the A4 or Letter size bond papers. (20% of the marks obtained will be reduced)
3. In the calculations, the student should maintain at least a precision of 3 decimal places with a correct rounding. (20% of the marks obtained will be reduced)

Questions

1. What are area and perimeter of the following geometrical shapes:
   (a) Triangle
   (b) Rhombus
   (c) Rectangle
   (d) Trapezoid
   (e) Square
   (f) Circle
   (g) Ellipse
2. What are surface area and volume of the following:
   (a) Cylinder
   (b) Sphere
   (c) Cone
   (d) Cube
   (e) Cuboid
3. Find derivative to the following terms where a, b, c are constants, x, y, z are variables and f, g, h, u, v are functions.
   (a) c
   (b) ax
   (c) x^2
   (d) $\sqrt{x}$
   (e) e^x
   (f) a^x
   (g) $\ln x$
   (h) $\log_a x$
   (i) $\sin x$
   (j) $\cos x$
   (k) $\tan x$
   (l) $\arcsin x$
   (m) $\arccos x$
   (n) $\arctan x$
   (o) cf
   (p) x^n
   (q) $f + g$
   (r) $f - g$
   (s) $f \times g$
   (t) $\frac{f}{g}$
   (u) $\frac{1}{f}$
   (v) $f(g(x))$
4. Resolve the following terms with a, b, c as constants, x, y, z as variables and f, g, h, u, v as functions.
   (a) $\frac{\mathrm{d}}{\mathrm{d}x}\left(3x^3\right)$
   (b) $\frac{\mathrm{d}}{\mathrm{d}x}\left(x^4 + x^3\right)$
   (c) $\frac{\mathrm{d}}{\mathrm{d}z}\left(z^3 - 3z^2\right)$
   (d) $\frac{\mathrm{d}}{\mathrm{d}v}\left(6v^4 - 3v^5 + 5v^6\right)$
   (e) $\frac{\mathrm{d}}{\mathrm{d}x}\left((x-1)(x+3)\right)$
   (f) $\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{3x^3 - x^2}{x}\right)$
   (g) $\frac{\mathrm{d}}{\mathrm{d}x}\left(x \sin\left(x\right)\right)$
   (h) $\frac{\mathrm{d}}{\mathrm{d}x}\left(x^2 \ln\left(x\right)\right)$
   (i) $\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{\cos\left(x\right)}{x}\right)$
   (j) $\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{1}{x^2+1}\right)$
   (k) $\frac{\mathrm{d}}{\mathrm{d}x}\left(\cos\left(x^2\right)\right)$
   (l) $\frac{\mathrm{d}}{\mathrm{d}x}\left(\exp\{x^3\}\right)$
   (m) $\frac{\mathrm{d}}{\mathrm{d}x}\left(\ln\left(\sin\left(x\right)\right)\right)$