hoffmannchap7.mw
Maple 9.5 Worksheet for Problems in Math 165 - Calculus for Business.

First load plots and student:
Definite integrals are written and evaluated using Maple commands Int and int.
int(f(x), x = a .. b) is the equivalent (almost) of your TI calculator calculator fnInt(f(x),x,a,b).
An alternate method to evaluate the definite integral is value(Int).
N.B. A Maple command such as eval(f(x),x=2) is the instruction
``Evaluate f(2)" or
``evaluate the function f(x) at x = 2."
hoffmanchap7.pdf Math 165 Sample Questions Hoffmann Chapter 7
1. . Compute f(0, 0). exp(x) + exp(y)
A) 0
B) 1
C) 2
D) 3
f-1_

$$f\_1(x,y) := e^{x} + e^{y}$$
$$f\_1(0,0) := 2 \qquad (1)$$

2. If f(r,s)= exp(2*r + s), then f(ln3, ln5) is
A) 133
B) 300
C) 455
D) none of the above

$$f2(r,s) := f2(r, s)$$
$$f2(\ln 3, \ln 5) := e^{2\ln(3) + \ln(5)}$$
$$simplified\_answer := 45 \qquad (2)$$

3. A sports store in St. Louis carries two kinds of tennis rackets, the Venus Williams and the Martina Hingis autographed brands. The consumer demand for each brand depends not only on its own price, but also on the price of the competing brand. Sales figures indicate that if the Williams racket sells for x dollars per racket and the Hingis brand for y dollars per racket, the demand for Williams rackets will be rackets per year and the demand for the Hingis rackets will be rackets per year. Express the stores total annual revenue from the sale of these rackets as a function of the prices x and y.

$$D\_1(x,y) := 317 - 25x + 40y$$
$$D\_2(x,y) := 246 + 50x - 10y$$
$$R(x,y) := x\,(317 - 25x + 40y) + y\,(246 + 50x - 10y)$$
$$Answer\_3 := 317x - 25x^2 + 90xy + 246y - 10y^2 \qquad (3)$$

4. 4*x^2 - exp(y) Let . Compute f(6, 0).

$$f\_4(x,y) := 4\,x^2 - e^y$$

$$f\_4(6,0) := 143 \qquad (4)$$

5. True or false: If f_5(x,y) = x^3 * ln(y), then f(2, 1) = 8.

A) True

B) False

$$f\_5(x,y) := x^3 \ln(y)$$

$$f\_5(2,1) := 0$$

$$Answer\_5 := false \qquad (5)$$

6. Compute f_x for . 5*x*y^3

$$f\_6(x,y) := 5\,x\,y^3$$

$$f\_x := 5\,y^3 \qquad (6)$$

7. Compute all first-order partial derivatives of the given function. (4*x + 2*y)^3

$$f\_7(x,y) := (4\,x + 2\,y)^3$$

$$f\_x(x,y) := 12\,(4\,x + 2\,y)^2$$

$$f\_y(x,y) := 6\,(4\,x + 2\,y)^2 \qquad (7)$$

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8. NEED PI IN ANSWERS A soft drink can is a cylinder H cm tall with radius R cm. Its volume is given by the formula
V = pi*R^2 *H
. A particular can is 8 cm tall with radius 1 cm. Use calculus to estimate the change in volume that results if the radius is increased
by 1 cm while the height remains at 8 cm.

A) The volume is increased by 32p cm .

B) The volume is increased by 16p cm .

C) The volume is increased by 1p cm .

D) The volume is increased by 8p cm .

$$V(R,H) := \pi\,R^2\,H$$

$$V\_R(R,H) := 2\,\pi\,R\,H$$

$$dV := \left(2\,\pi\,R\,H\right)\Big|_{R=1,\,H=8}$$

$$Answer\_8 := 16\,\pi \qquad (8)$$

9. If f = x^4 * y^3 , then f_x(2,2) is
A) 256
B) 256
C) 192
D) 384

$$f\_9(x,y) := x^4\, y^3$$
$$f\_x(x,y) := 4\, x^3\, y^3$$
$$Answer\_9 := 256 \tag{9}$$

10. Compute f_xy for . x^9 + y^9
A) 0
B)
C) 72x
D) 72y

$$f\_10(x,y) := x^9 + y^9$$
$$f\_x := 9\, x^8$$
$$f\_xy := 0 \tag{10}$$

11. Daily output 10* K^(1/3) * L^(1/2) units. Use marginal analysis to estimate the change in daily output as a result of changing L from 625 to 626 while K remains constant at 216.

$$Q(K,L) := 10\, K^{1/3}\sqrt{L}$$
$$\frac{10}{3}\,\frac{\sqrt{L}\,dK}{K^{2/3}} + \frac{5\,K^{1/3}\,dL}{\sqrt{L}}$$
$$\left(\frac{10}{3}\,\frac{\sqrt{L}\,dK}{K^{2/3}} + \frac{5\,K^{1/3}\,dL}{\sqrt{L}}\right)\Bigg|_{K=216,\,L=625,\,dK=0,\,dL=1}$$
$$Answer\_11 := \frac{1}{125}\,216^{1/3}\sqrt{625}$$
$$\frac{6}{5} \tag{11}$$

12. True or false: If f(x, y) = 8x + 3xy + 2y, then f_xy =3.
A) True
B) False

$$f\_12(x,y) := 8\,x + 3\,x\,y + 2\,y$$
$$f\_x := 8 + 3\,y$$
$$f\_xy := 3$$

(12)

$$Answer\_12 := true \tag{12}$$

13. Consider the graph of the level curve f(x, y) = C for f(x,y) = x^2 - y and C = –3. The graph is

A) a parabola
B) a circle
C) an ellipse
D) a straight line

$$f\_13(x,y) := x^2 - y$$

$$Answer\_13 := x^2 - y = -3 \text{ is a parabola} \tag{13}$$

14.TYPO Machines sometimes don't "simplify" to the form you want!

14. Find the second partial f_xy given .f(x,y) = 3*x*exp(8*x*y) + y*ln(4*x + 9*y)

$$f\_14(x,y) := 3\,x\,e^{8xy} + y\ln(4x + 9y)$$

$$f\_x := 3\,e^{8xy} + 24\,x\,y\,e^{8xy} + \frac{4y}{4x + 9y}$$

$$f\_y := 24\,x^2\,e^{8xy} + \ln(4x + 9y) + \frac{9y}{4x + 9y}$$

$$f\_xy := 48\,x\,e^{8xy} + 192\,x^2\,y\,e^{8xy} + \frac{4}{4x + 9y} - \frac{36y}{(4x + 9y)^2}$$

$$\frac{1}{(4x + 9y)^2}\left(16x\left(48x^2\,e^{8xy} + 216\,x\,y\,e^{8xy} + 243\,e^{8xy}y^2 + 192\,e^{8xy}x^3\,y + 864\,e^{8xy}x^2\,y^2 + 972\,e^{8xy}x\,y^3 + 1\right)\right)$$

$$The\ Good\ One\ is\ f\_yx := 48\,y\,e^{8xy} + 192\,x\,y^2\,e^{8xy} - \frac{16y}{(4x + 9y)^2}$$

$$\frac{1}{(4x + 9y)^2}\left(16y\left(48x^2\,e^{8xy} + 216\,x\,y\,e^{8xy} + 243\,e^{8xy}y^2 + 192\,e^{8xy}x^3\,y + 864\,e^{8xy}x^2\,y^2 + 972\,e^{8xy}x\,y^3 - 1\right)\right) \tag{14}$$

15. Compute f_y for . 6*x*y^4

$$f\_15(x,y) := 6\,x\,y^4$$

$$f\_y := 24\,x\,y^3 \tag{15}$$

16. Compute f_x for . exp(5*x*y)

$$f\_16(x,y) := e^{5xy}$$

$$f\_x := 5\,y\,e^{5xy} \tag{16}$$

Problem 17 -- I won't use x since assigning `x` would require correction bfore proceeding to other problems.

$$Z := 2X - 6Y$$

$$X := t^4 \tag{17}$$

$$Y := 11\,t \tag{18}$$

$$Answer\_17 := 8\,t^3 - 66$$

$$Solution := \left(2 \Big|_{X=t^4,\ Y=11\,t}\right)\left(\frac{d}{dt}\,(t^4)\right) + \left((-6) \Big|_{X=t^4,\ Y=11\,t}\right)\left(\frac{d}{dt}\,(11\,t)\right)$$

$$Or,\ as\ we\ said := 8\,t^3 - 66 \tag{19}$$

N.B. Numbers don't make much sense. Note that you start with negative profit!

18. A mall kiosk sells two different models of pagers, the Elite and the Diamond. Their monthly profit from pager sales is where x and y are the prices of the Elite and the Diamond respectively, in dollars. At the moment, the Elite sells for $32 and the Diamond sells for $40. Use calculus to estimate the change in monthly profit if the kiosk operator raises the price of the Elite to $33 and lowers the price of the Diamond to $38.

A) Profit will increase by about $26.
B) Profit will decrease by about $310.
C) Profit will increase by about $194.
D) Profit will stay the same.

$$P(x,y) := (x-40)\,(20-5\,x+6\,y) + (y-50)\,(30+3\,x-4\,y)$$

$$Initial\ profit\ is\ P(32,40) := -460$$

$$P\_x := 70-10\,x+9\,y$$

$$P\_y := 9\,x-10-8\,y$$

$$dP := (70-10\,x+9\,y)\Big|_{x=32,\ y=40} - 2\left((9\,x-10-8\,y)\Big|_{x=32,\ y=40}\right)$$

$$Answer\_18 := 194 \tag{20}$$

Problem 19 f_ x for 4*x^6 * y - 3 *x + exp(x*y)

$$f19(x,y) := 4\,x^6\,y - 3\,x + e^{xy}$$

$$ddx\_f19(x,y) := 24\,x^5\,y - 3 + y\,e^{xy}$$

Answer Key

1. C
2. C
3. B
4. 143
5. B
6. D
7. A
8. B

9. A
10. A
11. 1.2
12. A
13. A
14. B
15. A
16. A
17. B
18. C
19. x * 24 * x^5 * y - 3 + y * e^(x * y)