City University
School of Engineering and Mathematical Sciences
Common Part 1

ME1107 Computing

Coursework 1 – Excel

- Use a separate worksheet for each answer within a single file (CW1_your_name.xls).
- Type your name, group and email address on each worksheet.
- Q1-2, Q4-5, Q7-8 submission: softcopy and hardcopy, due date: 20/10/2008
- Q3: in-class marking in week 2 tutorial class commencing 06/10/2008
- Q6: in-class marking in week 3 tutorial class commencing 13/10/2008

Q1 (15 marks) Construct a worksheet as shown to display the pressure of a gas at various temperatures and volumes using the van der Waals equation:

$$P = \frac{RT}{V-b} - \frac{a}{V^2}$$

Correct cell references should be used, so that the formula is entered in one cell and copied to the rest cells of the table

	A	B	C	D	E	F	G	H
1	**van der Waals Equation of State**							
2								
3		Gas	R	a	b		$P = \frac{RT}{V-b} - \frac{a}{V^2}$	
4		CO_2	0.082058	3.59	0.0427			
5								
6	Pressure in atmospheres at varying T and V							
7	Volume	Temperature (K)						
8		250	260	270	280	290	300	310
9	0.05	1374.21	1486.61	1599.02	1711.43	1823.84	1936.25	2048.65
10	0.10	-0.98	13.34	27.66	41.98	56.30	70.62	84.94
11	0.15	31.63	39.28	46.93	54.58	62.22	69.87	77.52
12	0.20	40.67	45.88	51.10	56.32	61.53	66.75	71.97
13	0.25	41.52	45.48	49.44	53.40	57.35	61.31	65.27
14	0.30	39.84	43.03	46.22	49.41	52.60	55.79	58.98
15	0.35	37.45	40.12	42.79	45.46	48.13	50.80	53.47
16	0.40	34.98	37.27	39.57	41.87	44.16	46.46	48.76
17	0.45	32.64	34.65	36.67	38.68	40.70	42.71	44.73
18	0.50	30.50	32.29	34.09	35.88	37.68	39.47	41.27

Video demonstration will be released online in week 1.

Key Steps:

- Merge cells A1:H1 for the title
- Enter the values in B8:H8 and in A9:A18 using the Series Fill method
- In B9 enter the formula =(C4*B8)/(A9-E4)-D4/(A9*A9).
- 4 Copy B9 to C9, see the change in formula in C9.
- Undo the copy, modify B9 using mixed and absolute reference.
- Copy B9 to the range B9:H18
- 7 Format the cells to improve the appearance.

Q2 (15 marks) Construct a worksheet to display the mass of a cylinder with radius varies from 1 cm to 10 cm at every 1 cm and length varies from 10 cm to 20 cm at every 5 cm. The density is 7.8 kg/m^3.

$$m = \rho \pi r^2 L$$

Correct cell references should be used, so that the formula is entered in one cell and copied to the rest cells of the table.

Q3 (5 marks) Show how to change cell references in formulas to names.
(This is an in-class marking question. Marking will be done in your tutorial class in week 2 commencing 06/10/08. No late submission will be accepted.)

Q4 (15 marks) Design a worksheet to solve a quadratic equation in the form $ax^2 + bx + c = 0$ using the quadratic formula: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

The quantity $\sqrt{b^2 - 4ac}$ is called the discriminant which determines the number (0, 1 or 2) of real roots of the equation.

	A	B	C	D	E	F	G	H	I
1	Design a worksheet to solve a quadratic equation in the form using the quadratic formula:								
2									
3	$ax^2 + bx + c = 0$								
4					$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$				
5									
6	Quadratic Equation Solver								
7	a	b	c		disc				
8	1	5	6		1				
9									
10	Number of real roots		2						
11	Root 1	-2	Root 2	-3					
12									

Video demonstration will be released online in week 2.

Key Steps:

- Formula in E8: =B8^2-4*A8*C8
- Formula in C10: =IF(E8<0,0,IF(E8=0,1,2))
- Formula in A11: =IF(C10=1,"Double Root",IF(C10=2,"Root 1",""))
- Formula in C11: =IF(C10=2,"Root 2","")
- Formula in B11: =IF(E8>=0, (-B8+SQRT(E8))/(2*A8),"")
- Formula in D11: =IF(E8>0,(-B8-SQRT(E8))/(2*A8),"")

Test the solver with different values of a, b and c. For example:

Quadratic Equation Solver				
a	b	c		disc
1	1	1		-3
Number of real roots		0		

Quadratic Equation Solver				
a	b	c		disc
1	-2	1		0
Number of real roots		1		
Double Ro	1			

Q5 (15 marks)

Construct a worksheet to calculate function $y = \begin{cases} A \cdot \dfrac{\sin(x)}{x} & x \neq 0 \\ A & x = 0 \end{cases}$

Initial values: A=10, x= 0

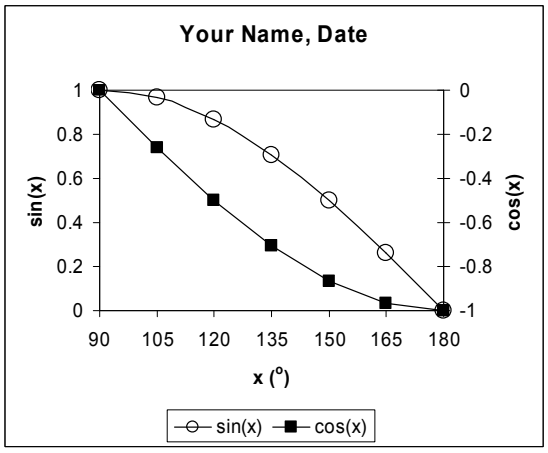
Q6 (5 marks)
Show how to use the following build-in functions: SUMIF and COUNTIF.
(This is an in-class marking question. Marking will be done in your tutorial class in week 3 commencing 13/10/08. No late submission will be accepted.)

Q7 (15 marks)
Use Microsoft Excel to re-produce the graph shown below. The task includes

1) calculating function y = sin(x) and y=cos(x) for $90^\circ \leq x \leq 180^\circ$ in step of 15°
2) plotting the two functions

Notes:

- Write your name and date in the chart title
- Use two y axes for the two functions



Video demonstration will be released online in week 3.

Q8 (15 marks)
A water pipe has varying diameters. Diameters at 10 locations are shown in the table below, where x is the location and d is the diameter.

1) Copy the table to a worksheet; complete the table using the given formulas in the table (correct cell references should be used);
2) Plot the two curves, i.e., d_1/d versus x and $1-(d_1/d)^4$ versus x on a single chart (assessment includes presentation of the table and the graph).

d_1: diameter at the 1st location

No.	1	2	3	4	5	6	7	8	9	10
x (mm)	0	80	122	164	238	312	386	460	534	607
d (mm)	41	41	28	15.5	21.4	27.8	34.1	40.5	40.5	40.5
d_1/d										
$1-(d_1/d)^4$										