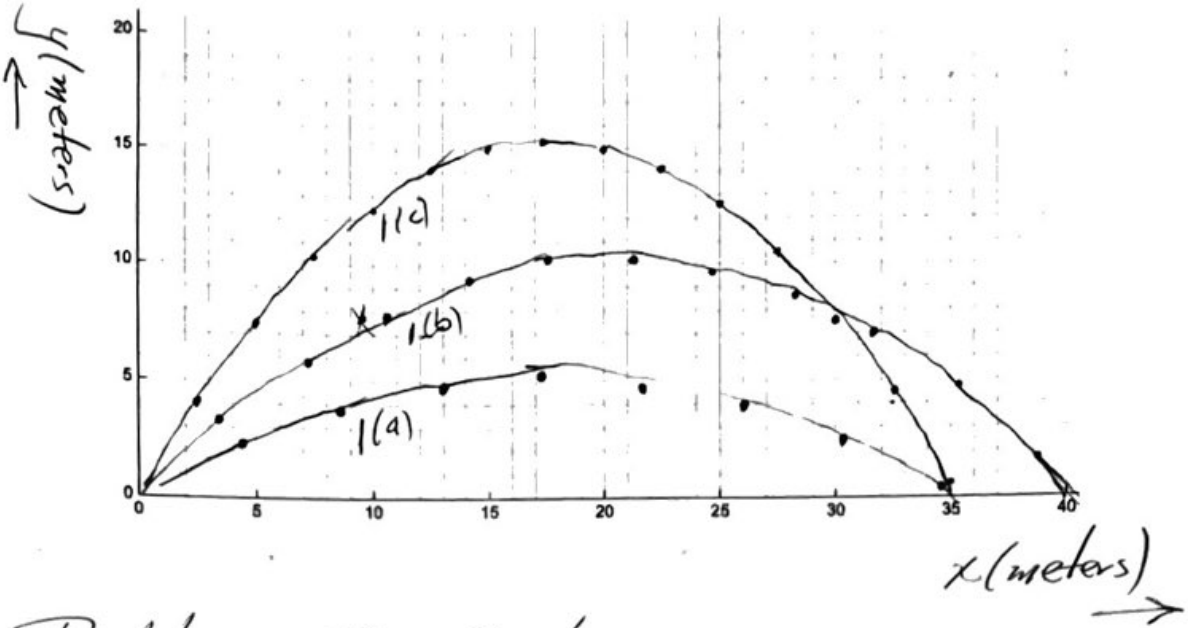
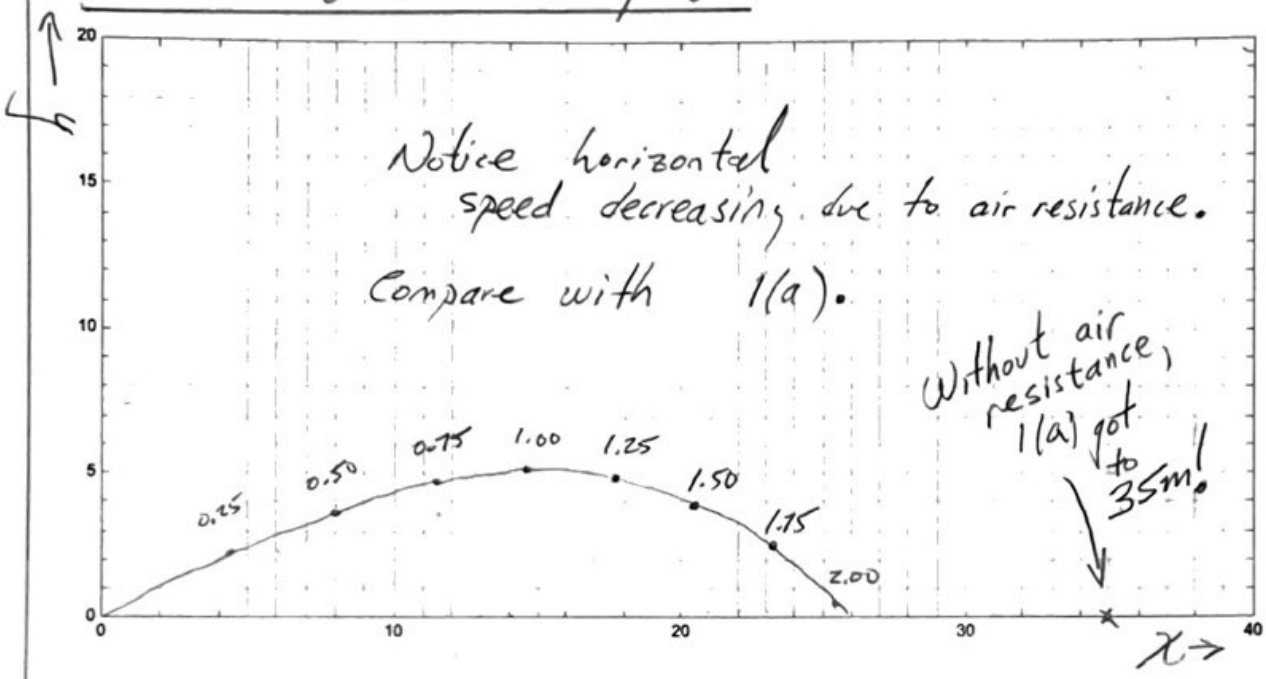
Problem Set 3 - Solution

Graphs for Problem 1



Problem 2 Code on Last Two Pages

Problem 3 Graph



Problem 4

From Base 2 to Base 10

$100000000_2 = 512_{10}$

Problem 5

(a) The program finished with an error! However, before it got to that it showed

11 14 14 15

(b)

B E E F

(c)

Red $0xFB = 15 \times 16 + 11 = 251_{10}$

Green $0xFC = 15 \times 16 + 12 = 252_{10}$

Blue $0xE0 = 14 \times 16 + 0 = 224_{10}$

(d) $0.00110011_2 = 0.2_{10}$

$\frac{3}{16}$

11

0.1875

← you can see the repetition

$\frac{1}{5} - \frac{3}{16} = \frac{16}{80} - \frac{15}{80}$ ↖ leaves $\frac{1}{80}$ as remainder which is $\frac{1}{5} \times \frac{1}{16}$ — so it repeats

Brian Hill

HP-25 Program Form

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Switch to PRGM mode, press [f] [PRGM], then key in the program.

DISPLAY LINE	DISPLAY CODE	KEY ENTRY	X	Y	Z	T	COMMENTS
00			v	θ			
01	14 09	→R	v_x	v_y			
02	23 02	STO 2					
03	21	x⇆y					
04	23 03	STO 3					
05	00	0					
06	23 04	STO 4					
07	24 00	RCL 0					
08	23 51 04	STO +4					Increment time
09	24 04	RCL 4	t				
10	15 02	g x^2	t^2				
11	24 01	RCL 1	g	t^2			
12	61	×	gt^2				
13	02	2					
14	71	÷					
15	32	CHS	$-\frac{1}{2}gt^2$				
16	24 04	RCL 4					
17	24 03	RCL 3					
18	61	×					
19	51	+	$v_y t - \frac{1}{2}gt^2$				x has been computed
20	24 01	RCL 1					
21	24 04	RCL 4					
22	61	×	gt				
23	24 05	RCL 5					
24	71	÷	$gt/v_{terminal}$				
25	32	CHS					
26	15 07	g e^x	$e^{-gt/v_{terminal}}$				
27	01	1					
28	41	−					
29	32	CHS	$1-e^{-gt/v_{terminal}}$				
30	24 02	RCL 2					
31	61	×					
32	24 05	RCL 5					
33	61	×					
34	24 01	RCL 1					
35	71	÷					y has been computed
36	24 04	RCL 4					Pause to display t
37	14 74	f PAUSE					
38	22	R↓					
39	74	R/S					
40	22	R↓					
41	74	R/S					
42	13 07	GTO 07					
43							
44							
45							
46							
47							
48							
49							

REGISTERS	
R_0	Δt
R_1	g
R_2	v_x
R_3	v_y
R_4	t
R_5	~~$v_{terminal}$~~ ?
R_6	
R_7	

Initial horizontal and vertical velocities

HEWLETT hp PACKARD

HP-25 Program Form

Title Plotting/Graphing with Air Resistance Page 2 of 2

Programmer Brian Hill

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Key in program			
2	Store time interval	$\Delta t \rightarrow R_0$	STO 0	
3	Store g	$g \rightarrow R_1$	STO 1	
4	Input angle	θ	ENTER↑	
5	Input speed	v	f PRGM	
6	Loop		R/S	
7			R/S	

Program pauses to display t, then displays x, then displays y. Do this repeatedly and make graph.