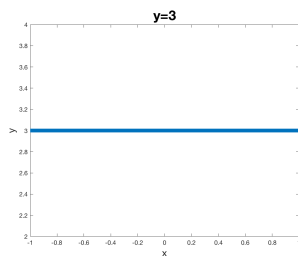
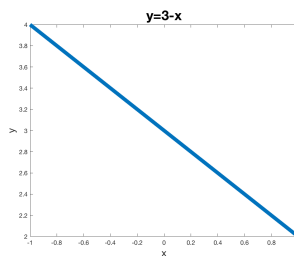


1. Graph each plot in 2-dimensional space

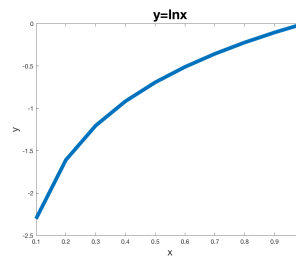
a.)  $y = 3$



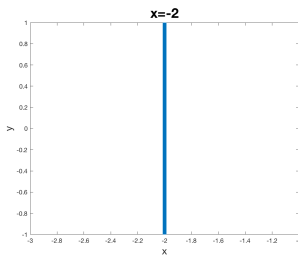
d.)  $y = 3 - x$



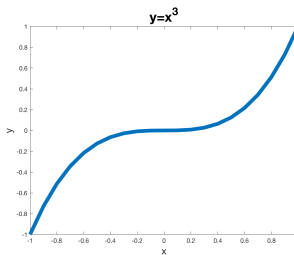
g.)  $y = \ln x$



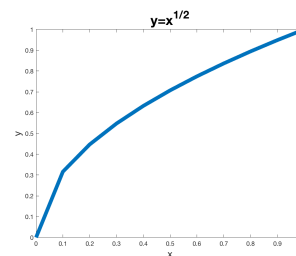
b.)  $x = -2$



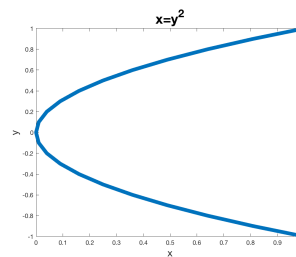
e.)  $y = x^3$



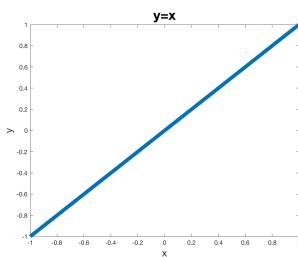
h.)  $y = \sqrt{x}$



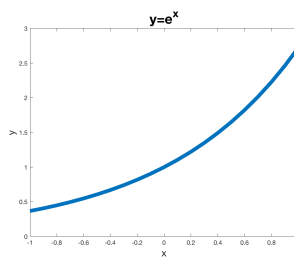
i.)  $x = y^2$



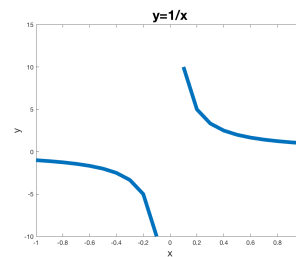
c.)  $y = x$



f.)  $y = e^x$

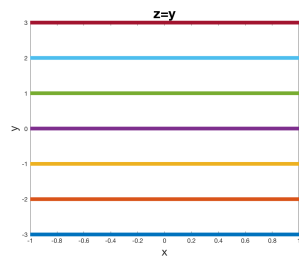


j.)  $y = \frac{1}{x}$

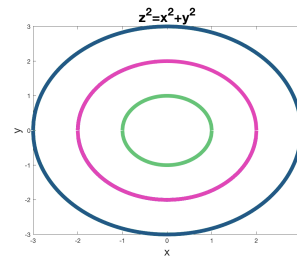


2. Sketch the level curves for each of the following equations (surfaces) using the following values of  $z$  :  $-3, -2, -1, 0, 1, 2, 3$ .

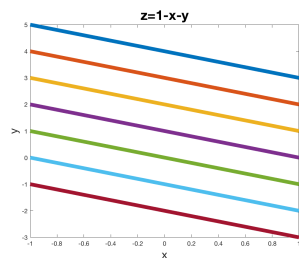
a.)  $z = y$



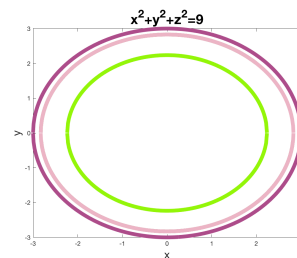
c.)  $z^2 = x^2 + y^2$



b.)  $z = 1 - x - y$

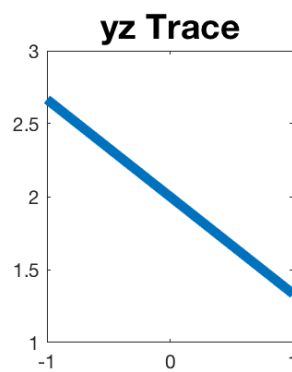
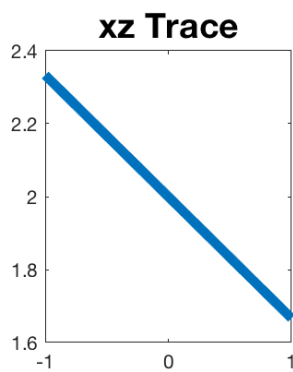
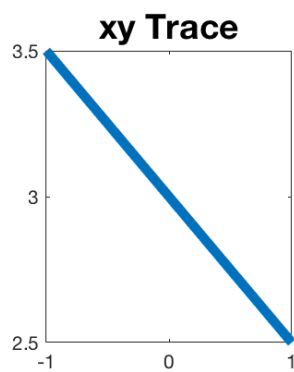


d.)  $x^2 + y^2 + z^2 = 9$

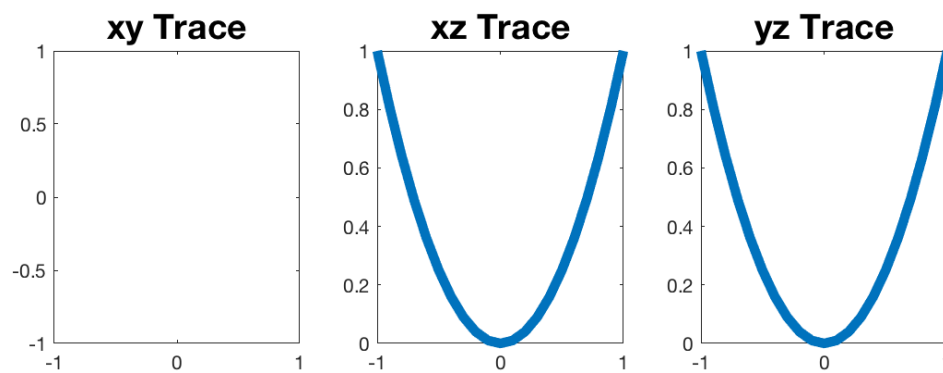


3. Sketch all three coordinate plane traces for each of the following equations (surfaces).

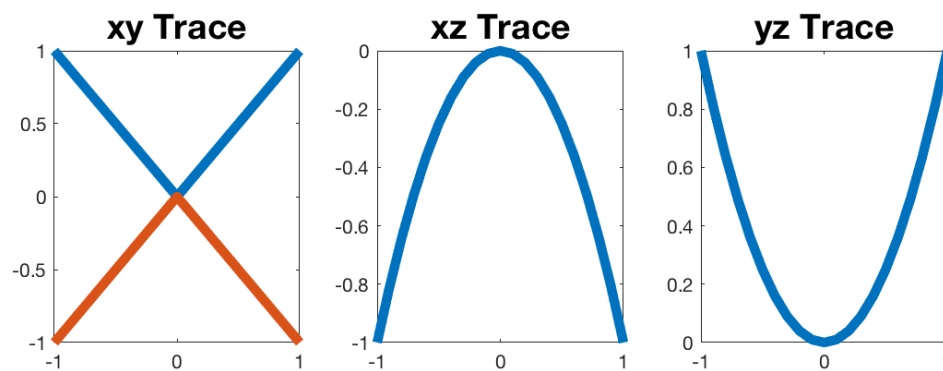
a.)  $x + 2y + 3z = 6$



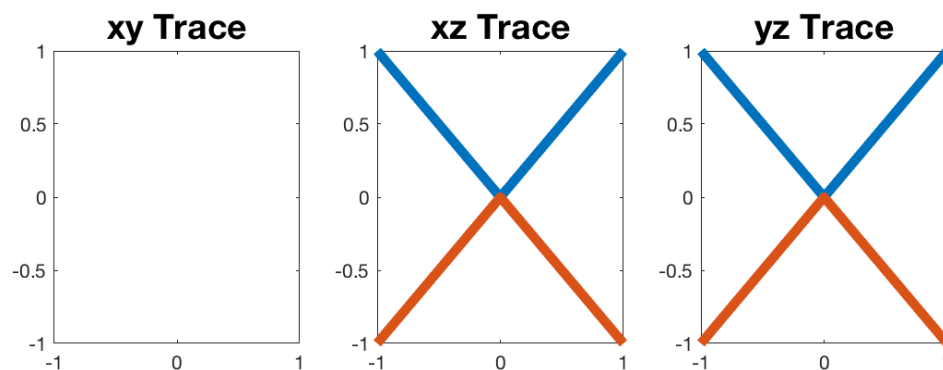
b.)  $z = x^2 + y^2$



c.)  $z = y^2 - x^2$

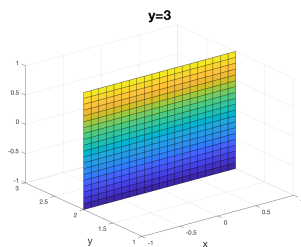


d.)  $z^2 = x^2 + y^2$

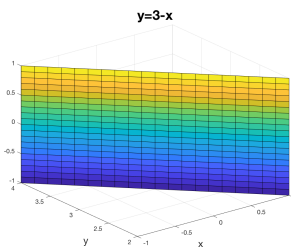


4. Sketch in three-dimensional space each of the following equations (surfaces). Use intercepts, traces, and/or level curves, if necessary.

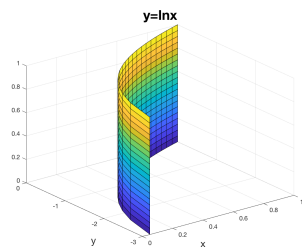
a.)  $y = 3$



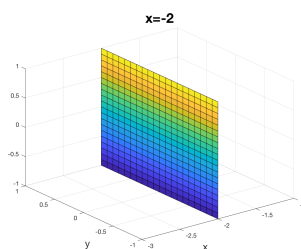
d.)  $y = 3 - x$



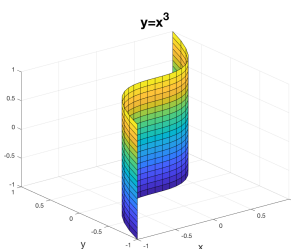
g.)  $y = \ln x$



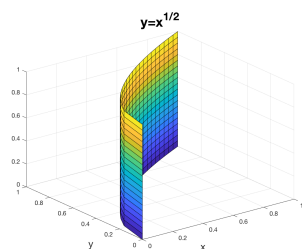
b.)  $x = -2$



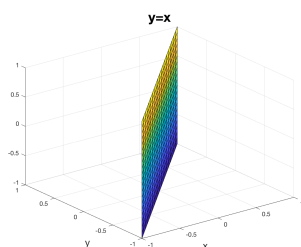
e.)  $y = x^3$



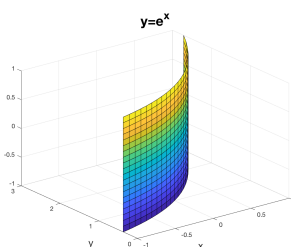
h.)  $y = \sqrt{x}$



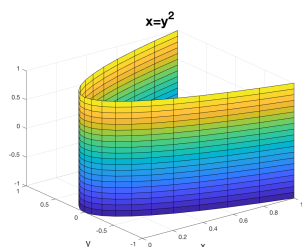
c.)  $y = x$



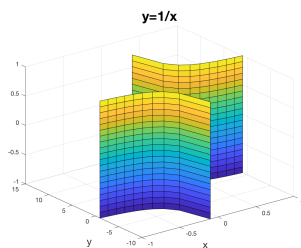
f.)  $y = e^x$



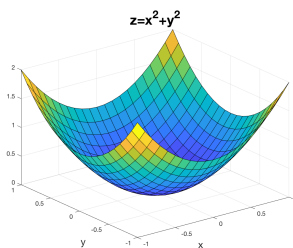
i.)  $x = y^2$



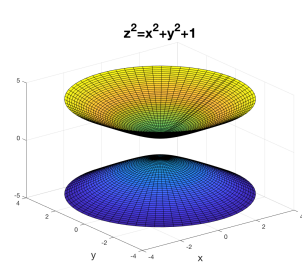
j.)  $y = \frac{1}{x}$



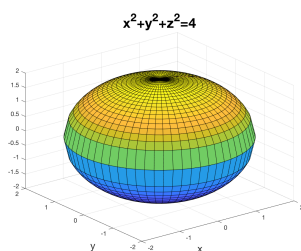
m.)  $z = x^2 + y^2$



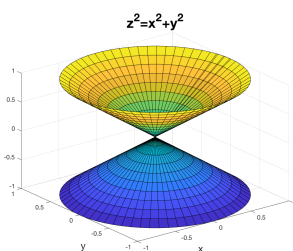
p.)  $z^2 = x^2 + y^2 + 1$



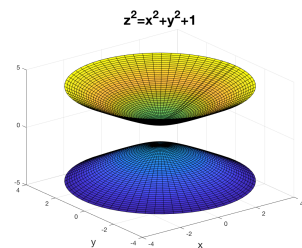
k.)  $x^2 + y^2 + z^2 = 4$



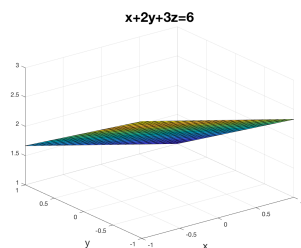
n.)  $z^2 = x^2 + y^2$



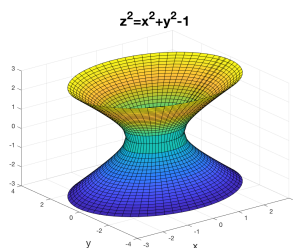
q.)  $z = y^2 - x^2$



l.)  $x + 2y + 3z = 6$



o.)  $z^2 = x^2 + y^2 - 1$



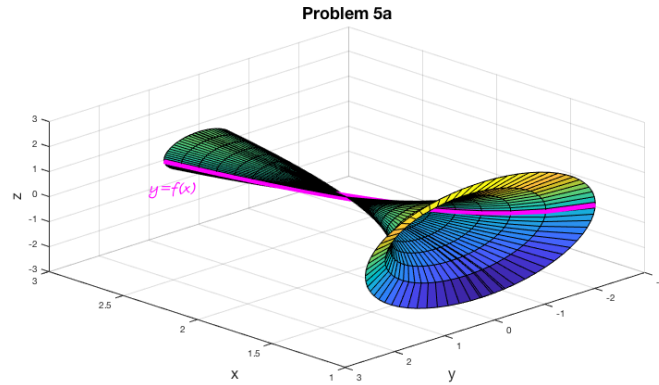
5. a.) Consider the graph of  $y = \ln(x - 1)$  in the  $xy$ -plane. Find an equation for the surface created by revolving this graph about the

i.)  $x$ -axis

The way to do this is consider many circles whose radius is the difference between the  $x$ -axis and  $y$ . Thus what we have is a circle given by

$$z^2 + y^2 = r^2$$

This is a circle in the  $yz$  plane. Using polar coordinates we get  $y = r \sin \theta$  and  $z = r \cos \theta$ , but  $r = f(x) = \ln(x - 1)$ . Moreover,  $\theta$  goes from 0 to  $2\pi$  since we are revolving about the  $x$  axis.



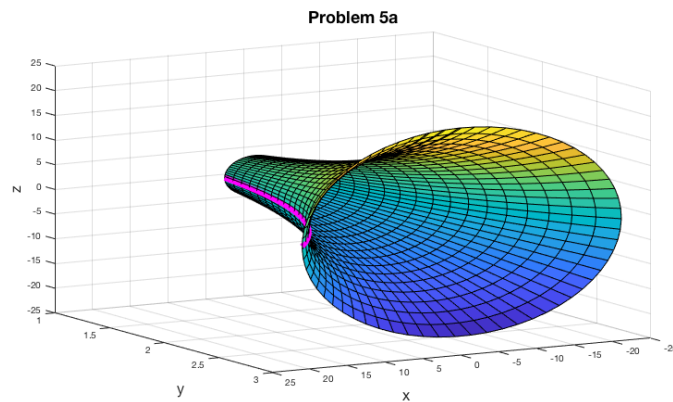
1. Rotating  $y = \ln(x - 1)$  about the  $x$ -axis.

ii.)  $y$ -axis

Similar to part ii, we have circles in the  $zx$  plane with radius

$$r = x = e^y + 1$$

thus we get  $z = r \sin \theta = (e^y + 1) \cos \theta$ ,  $x = r \cos \theta = (e^y + 1) \cos \theta$ .



2. Rotating  $x = e^y + 1$  about the  $y$ -axis.

b.) Consider the graph of  $z = \sin(x)$  in the  $xz$ -plane. Find an equation for the surface created by revolving this graph about the

i.)  $x$ -axis

$$z^2 + y^2 = \sin(x)^2$$

ii.)  $z$ -axis

$$x^2 + y^2 = \arcsin(z)^2$$

**6. Determine and sketch the domain of each function in 2D-Space and find the range of each function.**

**a.)  $z = 1 + x^2 + y^2$**

There are no values that cause  $1 + x^2 + y^2$  to be undefined. So the domain is  $\mathbb{R}^2$ . This creates a paraboloid starting at  $z = 1$ , so the range is  $z \in [1, \infty)$ .

**b.)  $z = 1 - x^2 - y^2$**

Again, no values of  $x$  or  $y$  are bad, so the domain is  $\mathbb{R}^2$ . This creates an inverted paraboloid starting at  $z = 1$ , so the range is  $z \in (-\infty, 1]$ .

**c.)  $z = 1 - x^2 + y^2$**

Again, no values of  $x$  or  $y$  are bad, so the domain is  $\mathbb{R}^2$ . This is a hyperbola in the  $xy$  plane. But since the range is only concerned with values of  $z$ , we could hold  $x$  constant and  $y^2$  gives us  $[0, \infty)$  and hold  $y$  constant and  $-x^2$  gives us  $(-\infty, 0]$ . Thus the range is  $z \in \mathbb{R}$ .

**d.)  $z = 1 - x - y$**

This is a plane, which is basically a line, so domain is  $\mathbb{R}^2$ , range is  $\mathbb{R}$ .

**e.)  $f(x, y) = \sqrt{1 - x - y}$**

Now we have to worry about a bad domain. In this case we need the  $1 - x - y \geq 0$  or  $y \geq x - 1$ . Thus our domain is  $\{x, y | y \geq x - 1\}$ . Note that obviously  $\sqrt{x} \geq 0$  so the range is  $z \in [0, \infty)$ .

**f.)  $f(x, y) = \sqrt{1 - x^2 - y^2}$**

We need  $1 - x^2 - y^2 \geq 0 \iff x^2 + y^2 \leq 1$ , thus our domain is  $\{x, y | x^2 + y^2 \leq 1\}$ . The easiest way to determine this range is to consider that

$$z = \sqrt{1 - x^2 - y^2} \iff z^2 + x^2 + y^2 = 1$$

which is a sphere of radius 1. However, since we are only looking at the positive square root, this is only the top half of the sphere. Thus the range is  $z \in [0, 1]$ .

**g.)  $f(x, y) = 5 + e^{-x^2 - y^2}$**

Any value of  $x$  and  $y$  can go into  $e^{-x^2 - y^2}$  so the domain is  $\mathbb{R}^2$ . Note that the largest value that  $-x^2 - y^2$  can be is 0, so the largest value  $5 + e^{-x^2 - y^2}$  can be is  $5 + e^0 = 6$ . Moreover

$$\lim_{x \rightarrow \infty} e^{-x} = \lim_{x \rightarrow \infty} \frac{1}{e^x} = 0$$

Therefore we have  $z \in (5, 6]$  as the range.

**h.)  $f(x, y) = 3 - \sqrt{y - \ln x}$**

Domain:  $\{x, y | y \geq \ln x, x > 0\}$

Range:  $z \in (-\infty, 3]$ .

i.)  $z = 3 \cos x + 4 \sin y$

Domain:  $\mathbb{R}^2$

Range:  $z \in [-7, 7]$ .

j.)  $z = 2 - 5 \sin \ln y$

Domain:  $\{x, y | y > 0\}$

Range:  $z \in [2 - 1, 2 + 1] = [1, 3]$ .

k.)  $z = \ln(25 - x^2 - y^2)$

Domain:  $\{x, y | x^2 + y^2 \leq 25\}$

Range:  $z \in (0, \ln(25)]$ .

l.)  $f(x, y) = \ln(x^2 + y^2 - 25)$

m.)  $f(x, y) = \frac{7}{x^2 - y}$

n.)  $f(x, y) = \frac{7}{x^2 + y^2}$

o.)  $f(x, y) = \frac{8}{2 + \sqrt{x - 2y}}$

p.)  $z = \frac{8}{2 - \ln(x + y)}$



## Code

```
1 % -----
2 % Problem 1 – Plot the following on 2D plots
3 % -----
4 % a)  $y=3$ 
5 figure;
6 x = -1:.1:1; y = zeros(length(x),1)+3;
7 plot(x,y,'Linewidth',6); title('y=3','FontSize',22);
8 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
9 saveas(gcf,'1a.png')
10 % b)  $x=-2$ 
11 figure;
12 y = -1:.1:1; x = zeros(length(x),1)-2;
13 plot(x,y,'Linewidth',6); title('x=-2','FontSize',22);
14 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
15 saveas(gcf,'1b.png')
16 % c)  $y=x$ 
17 figure;
18 x = -1:.1:1; y = x;
19 plot(x,y,'Linewidth',6); title('y=x','FontSize',22);
20 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
21 saveas(gcf,'1c.png')
22 % d)  $y=3-x$ 
23 figure;
24 x = -1:.1:1; y = 3-x;
25 plot(x,y,'Linewidth',6); title('y=3-x','FontSize',22);
26 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
27 saveas(gcf,'1d.png')
28 % e)  $y=x^3$ 
29 figure;
30 x = -1:.1:1; y = x.^3;
31 plot(x,y,'Linewidth',6); title('y=x^3','FontSize',22);
32 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
33 saveas(gcf,'1e.png')
34 % f)  $y=e^x$ 
35 figure;
36 x = -1:.1:1; y = exp(x);
37 plot(x,y,'Linewidth',6); title('y=e^x','FontSize',22);
38 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
39 saveas(gcf,'1f.png')
40 % g)  $y=\ln x$ 
41 figure;
42 x = 0:.1:1; y = log(x); % Note  $\log(x) = \ln(x)$ 
43 plot(x,y,'Linewidth',6); title('y=lnx','FontSize',22);
44 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
45 saveas(gcf,'1g.png')
46 % h)  $y=\sqrt{x}$ 
47 figure;
48 x = 0:.1:1; y = sqrt(x);
49 plot(x,y,'Linewidth',6); title('y=x^{1/2}','FontSize',22);
50 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
51 saveas(gcf,'1h.png')
52 % i)  $x=y^2$ 
53 figure;
54 y = -1:.1:1; x = y.^2;
55 plot(x,y,'Linewidth',6); title('x=y^2','FontSize',22);
56 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
57 saveas(gcf,'1i.png')
58 % j)  $y=1/x$ 
59 figure;
60 x = -1:.1:1; y = 1./x;
61 plot(x,y,'Linewidth',6); title('y=1/x','FontSize',22);
62 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
63 saveas(gcf,'1j.png')
```

```

64
65 % -----
66 % Problem 2 – Plot level curves of the following
67 % -----
68 zs = -3:3;
69 % a) z=y
70 figure;
71 x = -1:.1:1;
72 for z=zs
73     y=zeros(1,length(x))+z;
74     plot(x,y,'Linewidth',6);hold on;
75 end
76 title('z=y','FontSize',22);
77 xlabel('x','FontSize',18);ylabel('y','FontSize',18);
78 saveas(gcf,'2a.png')
79 % b) z=1-x-y
80 figure;
81 x = -1:.1:1;
82 for z=zs
83     y=1-zeros(1,length(x))-z-x;
84     plot(x,y,'Linewidth',6);hold on;
85 end
86 title('z=1-x-y','FontSize',22);
87 xlabel('x','FontSize',18);ylabel('y','FontSize',18);
88 saveas(gcf,'2b.png')
89 % c) z^2=x^2+y^2
90 figure;
91 x = -3:.00001:3;
92 for z=zs
93     col = [rand(1),rand(1),rand(1)];
94     % Plot top of circle
95     y=sqrt((zeros(1,length(x))-z).^2-x.^2);
96     y(real(y)==0)=NaN;
97     plot(x,y,'Linewidth',6,'Color',col);hold on;
98     % Plot bottom of circle
99     y=-sqrt((zeros(1,length(x))-z).^2-x.^2);
100    y(real(y)==0)=NaN;
101    plot(x,y,'Linewidth',6,'Color',col);hold on;
102 end
103 title('z^2=x^2+y^2','FontSize',22);
104 xlabel('x','FontSize',18);ylabel('y','FontSize',18);
105 saveas(gcf,'2c.png')
106 % d) x^2+y^2+z^2=9
107 figure;
108 x = -3:.00001:3;
109 for z=zs
110     col = [rand(1),rand(1),rand(1)];
111     % Plot top of circle
112     y=sqrt(9-(zeros(1,length(x))-z).^2-x.^2);
113     y(real(y)==0)=NaN;
114     plot(x,y,'Linewidth',6,'Color',col);hold on;
115     % Plot bottom of circle
116     y=-sqrt(9-(zeros(1,length(x))-z).^2-x.^2);
117     y(real(y)==0)=NaN;
118     plot(x,y,'Linewidth',6,'Color',col);hold on;
119 end
120 title('x^2+y^2+z^2=9','FontSize',22);
121 xlabel('x','FontSize',18);ylabel('y','FontSize',18);
122 saveas(gcf,'2d.png')
123
124
125
126
127
128

```

```

129 %
130 % Problem 3 – Plot the plane traces
131 %
132 % a)  $x+2y+3z=6$ 
133 a = -1:.1:1; figure;
134 % Plot xy trace
135 x = a; y = (1/2)*(6-x);
136 subplot(1,3,1);
137 plot(x,y, 'Linewidth',5);
138 title('xy Trace','FontSize',18);
139 % Plot xz trace
140 x = a; z = (1/3)*(6-x);
141 subplot(1,3,2);
142 plot(x,z, 'Linewidth',5);
143 title('xz Trace','FontSize',18);
144 % Plot yz trace
145 y = a; z = (1/3)*(6-2*y);
146 subplot(1,3,3);
147 plot(y,z, 'Linewidth',5);
148 title('yz Trace','FontSize',18);
149 set(gcf, 'Position', [100 200 600 200])
150 saveas(gcf, '3a.png');
151
152 % b)  $z=x^2+y^2$ 
153 a = -1:.1:1; figure;
154 % Plot xy trace
155 x = 0;
156 subplot(1,3,1);
157 plot(x,sqrt(-x.^2), 'Linewidth',5);hold on;
158 plot(x,-sqrt(-x.^2), 'Linewidth',5);
159 title('xy Trace','FontSize',18);
160 % Plot xz trace
161 x = a; z = x.^2;
162 subplot(1,3,2);
163 plot(x,z, 'Linewidth',5);
164 title('xz Trace','FontSize',18);
165 % Plot yz trace
166 y = a; z = y.^2;
167 subplot(1,3,3);
168 plot(y,z, 'Linewidth',5);
169 title('yz Trace','FontSize',18);
170 set(gcf, 'Position', [100 200 600 200])
171 saveas(gcf, '3b.png');
172
173 % c)  $z=y^2-x^2$ 
174 a = -1:.1:1; figure;
175 % Plot xy trace
176 x = a;
177 subplot(1,3,1);
178 plot(x,sqrt(x.^2), 'Linewidth',5);hold on;
179 plot(x,-sqrt(x.^2), 'Linewidth',5);
180 title('xy Trace','FontSize',18);
181 % Plot xz trace
182 x = a; z = -x.^2;
183 subplot(1,3,2);
184 plot(x,z, 'Linewidth',5);
185 title('xz Trace','FontSize',18);
186 % Plot yz trace
187 y = a; z = y.^2;
188 subplot(1,3,3);
189 plot(y,z, 'Linewidth',5);
190 title('yz Trace','FontSize',18);
191 set(gcf, 'Position', [100 200 600 200])
192 saveas(gcf, '3c.png');
193

```

```

194 % d)  $z^2 = x^2 + y^2$ 
195 a = -1:.1:1; figure;
196 % Plot xy trace
197 x = a;
198 subplot(1,3,1);
199 plot(0,0,'Linewidth',5);
200 title('xy Trace','FontSize',18);
201 % Plot xz trace
202 x = a;
203 subplot(1,3,2);
204 plot(x,sqrt(x.^2),'Linewidth',5); hold on;
205 plot(x,-sqrt(x.^2),'Linewidth',5);
206 title('xz Trace','FontSize',18);
207 % Plot yz trace
208 y = a; z = y.^2;
209 subplot(1,3,3);
210 plot(y,sqrt(y.^2),'Linewidth',5); hold on;
211 plot(y,-sqrt(y.^2),'Linewidth',5);
212 title('yz Trace','FontSize',18);
213 set(gcf,'Position',[100 200 600 200])
214 saveas(gcf,'3d.png');
215
216
217 % -----
218 % Problem 4 – Plot the following on 3D plots
219 % -----
220 % a)  $y=3$ 
221 figure;
222 [x,z] = meshgrid(-1:.1:1); y = zeros(size(x))+2;
223 surf(x,y,z); title('y=3','FontSize',22);
224 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
225 saveas(gcf,'4a.png')
226 % b)  $x=-2$ 
227 figure;
228 [y,z] = meshgrid(-1:.1:1); x = zeros(size(x))-2;
229 surf(x,y,z); title('x=-2','FontSize',22);
230 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
231 saveas(gcf,'4b.png')
232 % c)  $y=x$ 
233 figure;
234 [x,z] = meshgrid(-1:.1:1); y = x;
235 surf(x,y,z); title('y=x','FontSize',22);
236 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
237 saveas(gcf,'4c.png')
238 % d)  $y=3-x$ 
239 figure;
240 [x,z] = meshgrid(-1:.1:1); y = 3-x;
241 surf(x,y,z); title('y=3-x','FontSize',22);
242 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
243 saveas(gcf,'4d.png')
244 % e)  $y=x^3$ 
245 figure;
246 [x,z] = meshgrid(-1:.1:1); y = x.^3;
247 surf(x,y,z); title('y=x^3','FontSize',22);
248 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
249 saveas(gcf,'4e.png')
250 % f)  $y=e^x$ 
251 figure;
252 [x,z] = meshgrid(-1:.1:1); y = exp(x);
253 surf(x,y,z); title('y=e^x','FontSize',22);
254 xlabel('x','FontSize',16); ylabel('y','FontSize',16);
255 saveas(gcf,'4f.png')
256 % g)  $y=\ln x$ 
257 figure;
258 [x,z] = meshgrid(0:.05:1); y = log(x); % Note  $\log(x) = \ln(x)$ 

```

```

259 surf(x,y,z); title('y=lnx','FontSize',22);
260 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
261 saveas(gcf,'4g.png')
262 % h) y=sqrt(x)
263 figure;
264 [x,z] = meshgrid(0:.05:1); y = sqrt(x);
265 surf(x,y,z); title('y=x^{1/2}','FontSize',22);
266 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
267 saveas(gcf,'4h.png')
268 % i) x=y^2
269 figure;
270 [y,z] = meshgrid(-1:.1:1); x = y.^2;
271 surf(x,y,z); title('x=y^2','FontSize',22);
272 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
273 saveas(gcf,'4i.png')
274 % j) y=1/x
275 figure;
276 [x,z] = meshgrid(-1:.1:1); y = 1./x;
277 surf(x,y,z); title('y=1/x','FontSize',22);
278 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
279 saveas(gcf,'4j.png')
280 % k) x^2+y^2+z^2=4
281 figure;
282 [r,theta] = meshgrid(0:.1:2,0:.1:2*pi); % Polar coords
283 x = r.*cos(theta); y = r.*sin(theta);
284 surf(x,y,real(sqrt(4-x.^2-y.^2)));hold on;
285 surf(x,y,-real(sqrt(4-x.^2-y.^2))); title('x^2+y^2+z^2=4','FontSize',22);
286 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
287 saveas(gcf,'4k.png')
288 % l) x+2y+3z=6
289 figure;
290 [x,y] = meshgrid(-1:.1:1);
291 z = (1/3)*(6-2*y-x);
292 surf(x,y,z); title('x+2y+3z=6','FontSize',22);
293 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
294 saveas(gcf,'4l.png')
295 % m) z=x^2+y^2
296 figure;
297 [x,y] = meshgrid(-1:.1:1);
298 z = x.^2+y.^2;
299 surf(x,y,z); title('z=x^2+y^2','FontSize',22);
300 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
301 saveas(gcf,'4m.png')
302 % n) z^2=x^2+y^2
303 figure;
304 [r,theta] = meshgrid(0:.1:1,0:.1:2.1*pi); % Polar coords
305 x = r.*cos(theta); y = r.*sin(theta);
306 surf(x,y,real(sqrt(x.^2+y.^2)));hold on;
307 surf(x,y,-real(sqrt(x.^2+y.^2))); title('z^2=x^2+y^2','FontSize',22);
308 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
309 saveas(gcf,'4n.png')
310 % o) z^2=x^2+y^2-1
311 figure;
312 [r,theta] = meshgrid(0:.1:3,0:.1:2.1*pi); % Polar coords
313 x = r.*cos(theta); y = r.*sin(theta);
314 surf(x,y,real(sqrt(x.^2+y.^2-1)));hold on;
315 surf(x,y,-real(sqrt(x.^2+y.^2-1))); title('z^2=x^2+y^2-1','FontSize',22);
316 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
317 saveas(gcf,'4o.png')
318 % p) z^2=x^2+y^2+1
319 figure;
320 [r,theta] = meshgrid(0:.1:4,0:.1:2.1*pi); % Polar coords
321 x = r.*cos(theta); y = r.*sin(theta);
322 surf(x,y,real(sqrt(x.^2+y.^2+1)));hold on;
323 surf(x,y,-real(sqrt(x.^2+y.^2+1))); title('z^2=x^2+y^2+1','FontSize',22);

```

```

324 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
325 saveas(gcf,'4p.png')
326 % q)  $z=y^2-x^2$ 
327 figure;
328 [x,y] = meshgrid(-1:1:1);
329 z = y.^2-x.^2;
330 surf(x,y,z); title('z=y^2-x^2','FontSize',22);
331 xlabel('x','FontSize',16);ylabel('y','FontSize',16);
332 saveas(gcf,'4q.png')
333
334
335 % -----
336 % Problem 5 – Revolve around axes
337 % -----
338 % a) i)  $y=\ln(x-1)$ 
339 figure;
340 [x,t] = meshgrid(1.1:1:3,0:1:2.1*pi);
341 y = log(x-1).*sin(t);
342 z = log(x-1).*cos(t);
343 surf(x,y,z); hold on;
344 [x,~] = meshgrid(1.1:1:3);
345 surf(x,log(x-1),zeros(size(x)));
346 title('Problem 5a','FontSize',18);xlabel('x','FontSize',16);
347 ylabel('y','FontSize',16);zlabel('z','FontSize',16);
348
349 % a) ii)  $x=e^y+1$ 
350 figure;
351 [y,t] = meshgrid(1.1:1:3,0:1:2.1*pi);
352 x = (exp(y)+1).*sin(t);
353 z = (exp(y)+1).*cos(t);
354 surf(x,y,z); hold on;
355 [y,~] = meshgrid(1.1:1:3);
356 surf(exp(y)+1,y,zeros(size(y)));
357 title('Problem 5a','FontSize',18);xlabel('x','FontSize',16);
358 ylabel('y','FontSize',16);zlabel('z','FontSize',16);
359
360 % b) i)  $z=\sin(x)$ 
361 figure;
362 [x,t] = meshgrid(1.1:1:3,0:1:2.1*pi);
363 y = sin(x).*sin(t);
364 z = sin(x).*cos(t);
365 surf(x,y,z); hold on;
366 [x,~] = meshgrid(1.1:1:3);
367 surf(x,zeros(size(x)),sin(x));
368 title('Problem 5b i','FontSize',18);xlabel('x','FontSize',16);
369 ylabel('y','FontSize',16);zlabel('z','FontSize',16);
370
371 % b) ii)  $x=\arccos(z)$ 
372 figure;
373 [y,t] = meshgrid(1.1:1:3,0:1:2.1*pi);
374 x = (exp(y)+1).*sin(t);
375 z = (exp(y)+1).*cos(t);
376 surf(x,y,z); hold on;
377 [y,~] = meshgrid(1.1:1:3);
378 surf(exp(y)+1,y,zeros(size(y)));
379 title('Problem 5a','FontSize',18);xlabel('x','FontSize',16);
380 ylabel('y','FontSize',16);zlabel('z','FontSize',16);

```