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# Zachary Kolodny

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UID: 112311827 - MATH241 - CALC III - MATLAB Project 3

```
clear all;
syms x y z theta r t u;
```

## Task 1

```
int(int(int(x,z,0,9-x^2-y^2),y,0,x),x,0,2)
```

*ans* =

$232/15$

## Task 2

```
int(int(int(z*r,z,0,10-r*cos(theta)),r,0,sin(theta)),theta,0,pi/2)
```

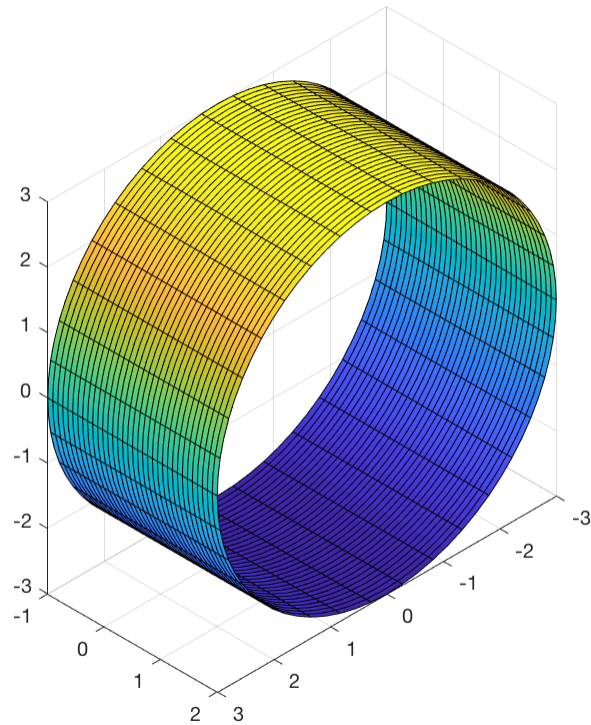
*ans* =

$(1601\pi)/256 - 5/6$

## Task 3

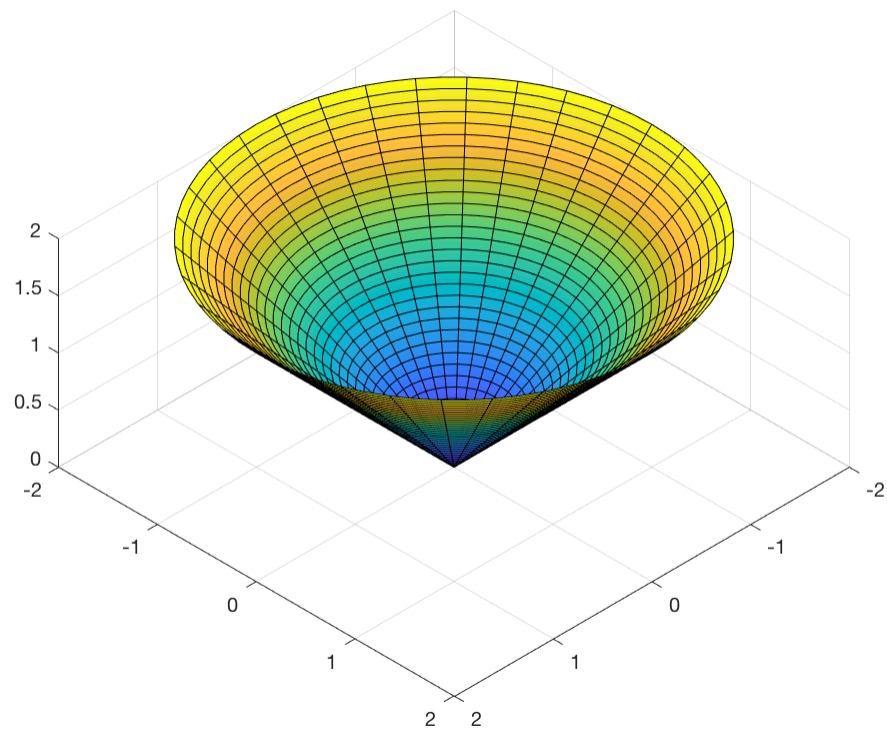
```
clear all;
syms x y z theta r t u;
rbar = [3*cos(theta),y,3*sin(theta)];
```

```
fsurf(rbar(1),rbar(2),rbar(3),[0,2*pi,-1,2])  
view([10 10 10])  
axis equal
```



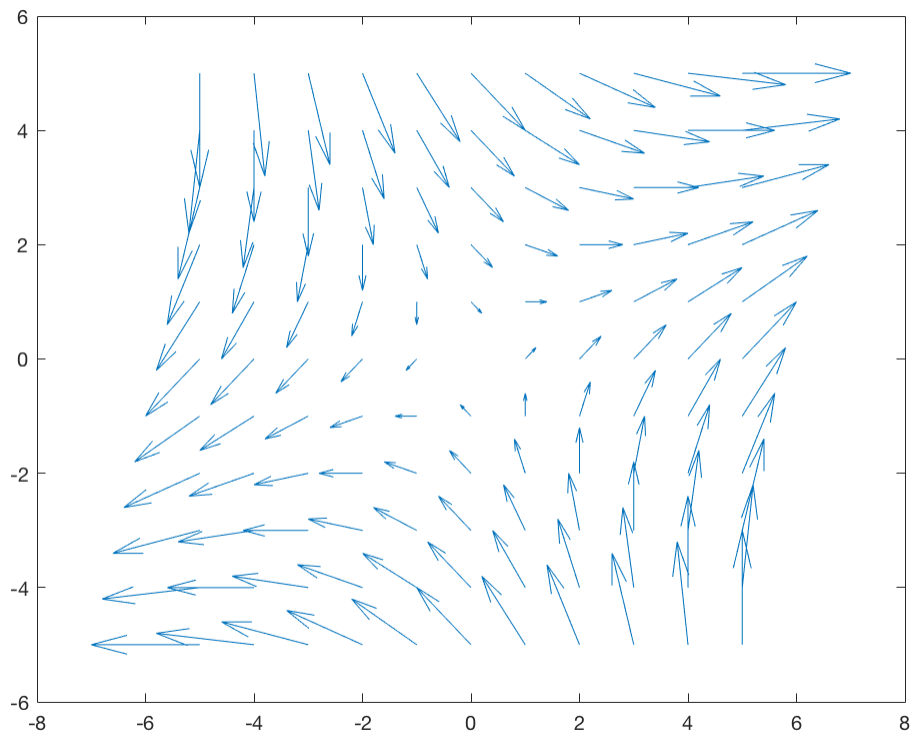
## Task 4

```
clear all;  
syms x y z theta r t u;  
rbar = [r*cos(theta),r*sin(theta),r];  
fsurf(rbar(1),rbar(2),rbar(3),[0,2,0,2*pi])  
view([10 10 10])  
axis equal
```



## Task 5

```
clear all;  
syms x y z theta r t u;  
[x,y] = meshgrid(-5:1:5,-5:1:5);  
quiver(x,y,.2*(x+y),.2*(x-y),0)
```



## Task 6

```
clear all;
syms x y z theta r t u;
rbar = [cos(t),sin(t)];
d = x^2 + y^4;
length = @(u) sqrt(u*transpose(u));
mag = simplify(length(diff(rbar,t)));
sub = subs(d,[x,y],rbar);
int(sub*mag,t,0,2*pi)
```

*ans* =

$(7\pi)/4$

## Task 7

```
clear all;
syms x y z theta r t u;
rbar = [3*t,t,t];
f = x + y;
length = @(u) sqrt(u*transpose(u));
mag = simplify(length(diff(rbar,t)));
```

```
sub = subs(f,[x,y,z],rbar);  
int(sub*mag,0,1)
```

*ans =*

$2 \cdot 11^{1/2}$

## Task 8

```
clear all;  
syms x y z theta r t u;  
rbar = [0,2*cos(t),2*sin(t)];  
F = [x*y,y*z,y];  
sub = subs(F,[x,y,z],rbar);  
int(dot(sub,diff(rbar,t)),0,2*pi)
```

*ans =*

$4\pi$

## Task 9

```
clear all;  
syms x y z theta r t u;  
rbar = [x,y,10-x-y];  
f = x^2+y^2;  
length = @(u) sqrt(u*transpose(u));  
mag = simplify(length(cross(diff(rbar,x),diff(rbar,y))));  
subresult = subs(f,[x,y,z],rbar);  
int(int(subresult*mag,x,-1,1),y,-1.1)
```

*ans =*

$-(3^{1/2} \cdot (1000y^3 + 1000y + 2431))/1500$

## Task 10

```
clear all;  
syms x y z theta r t u;  
rbar = [cos(t),sin(t),z];  
F = [y,-x,z];  
kross = simplify(cross(diff(-1*rbar,t),diff(rbar,z)));  
sub = subs(F,[y,-x,z],rbar);  
int(int(dot(sub,kross),z,0,3*sqrt(6)),t,0,2*pi)
```

*ans* =

$-6\pi 6^{1/2}$

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