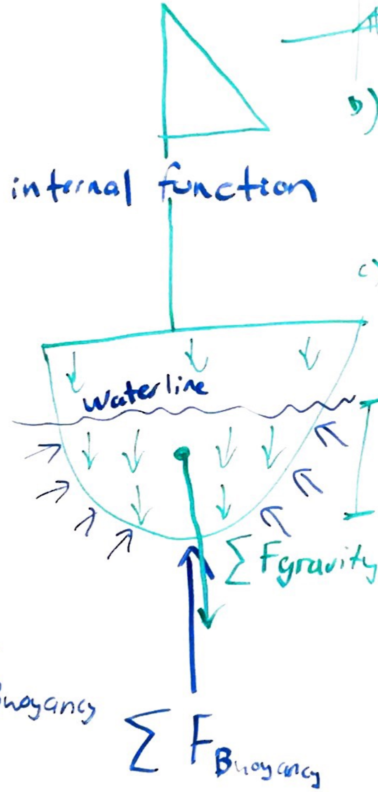
Questions

→ in a double integral, what does an internal function do graphically?

→ Region Plot in general

→ Exercise 12 / Changing order

→ 13 was just a Lot



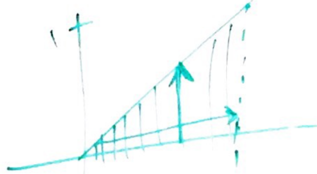
$$0 = \sum F_{gravity} + \sum F_{Buoyancy}$$

$$F_{gravity} = \sum mg$$

$$F_{buoyancy} = \int_R \rho \hat{n} \, dA$$

4 a) Double Integrals.

$dA = dx\,dy$, $dA = dy\,dx$



$$\int_0^1 \int_{y=0}^{y=x} dy\,dx = \int_0^1 x - 0 \, dx = \frac{x^2}{2}\Big|_0^1 = \frac{1}{2}$$

$$\int_0^1 \int_{x=y}^{x=1} dx\,dy = \int_0^1 1 - y \, dy = y - \frac{y^2}{2}\Big|_0^1 = 1 - \frac{1}{2} = \frac{1}{2}$$

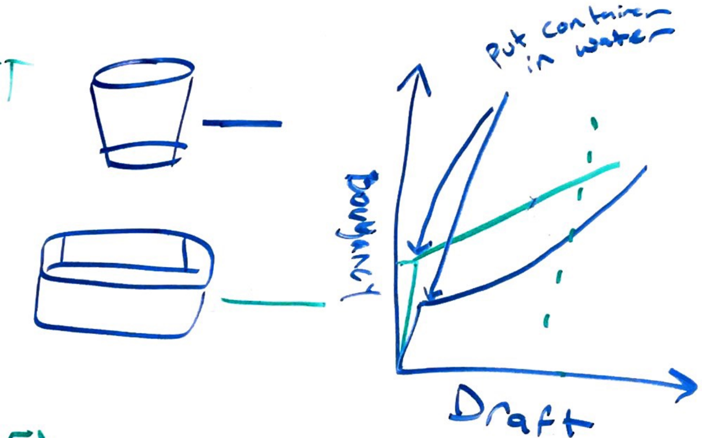
b) $M = \iint_R \rho \, dA$, $x_{cm} = \frac{1}{M} \iint_R x\rho \, dA$, $y_{cm} = \frac{1}{M} \iint_R y\rho \, dA$

total mass, density mass, Area

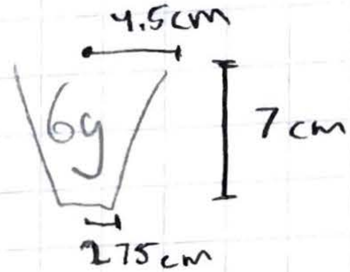
$com = (x_{cm}, y_{cm})$

c) Integrate[f, {var1, lower, upper}, {var2, lower, upper}]

RegionPlot[Bounds, {x_{min}, x_{max}}, {y_{min}, y_{max}}]



5) The cup would provide a gentler motion in wavelike conditions



(5) the cup would probably provide a gentler motion

$V = 517.5\ cm^3$

avg $r = 3.625$

$V = 7 \times \pi (3.625)^2$

$= 288.98\ cm^3$

$50g + 11g = 61g$
$61\ cm^3\ H_2O$
$61/(7.5 \times 11.5) = 0.71cm$

$50g + 6g = 61g$
$56cm^3\ H_2O$
$56/(\pi \times 2.75^2) = 2.36cm$

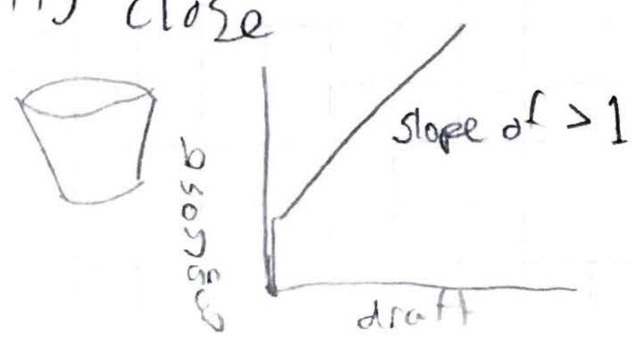
$100g + 11g = 111g \to 111cm^3$
$111/(7.5 \times 11.5) = 1.29cm$

$100g + 6g = 106g \to 106cm^3$
$106/(\pi \times \cancel{2.75}^2) = 4.96cm$
3.4 2.9

$150 + 11 = 161g \to 161\ cm^3$
$161/\text{area} = 1.87cm$

$150 + 6 = 156g \to$
$156/(\text{Area of bottom}) = \cancel{6.57}cm$ 3.8
$\pi \times 3.6^2$ Sink?

not exact but pretty close

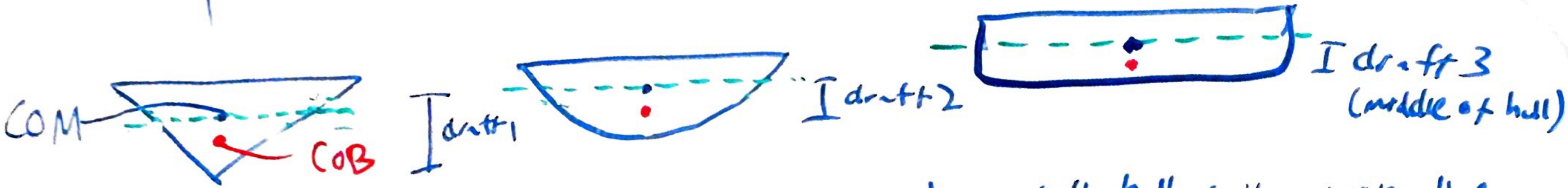



-150
-100
-50

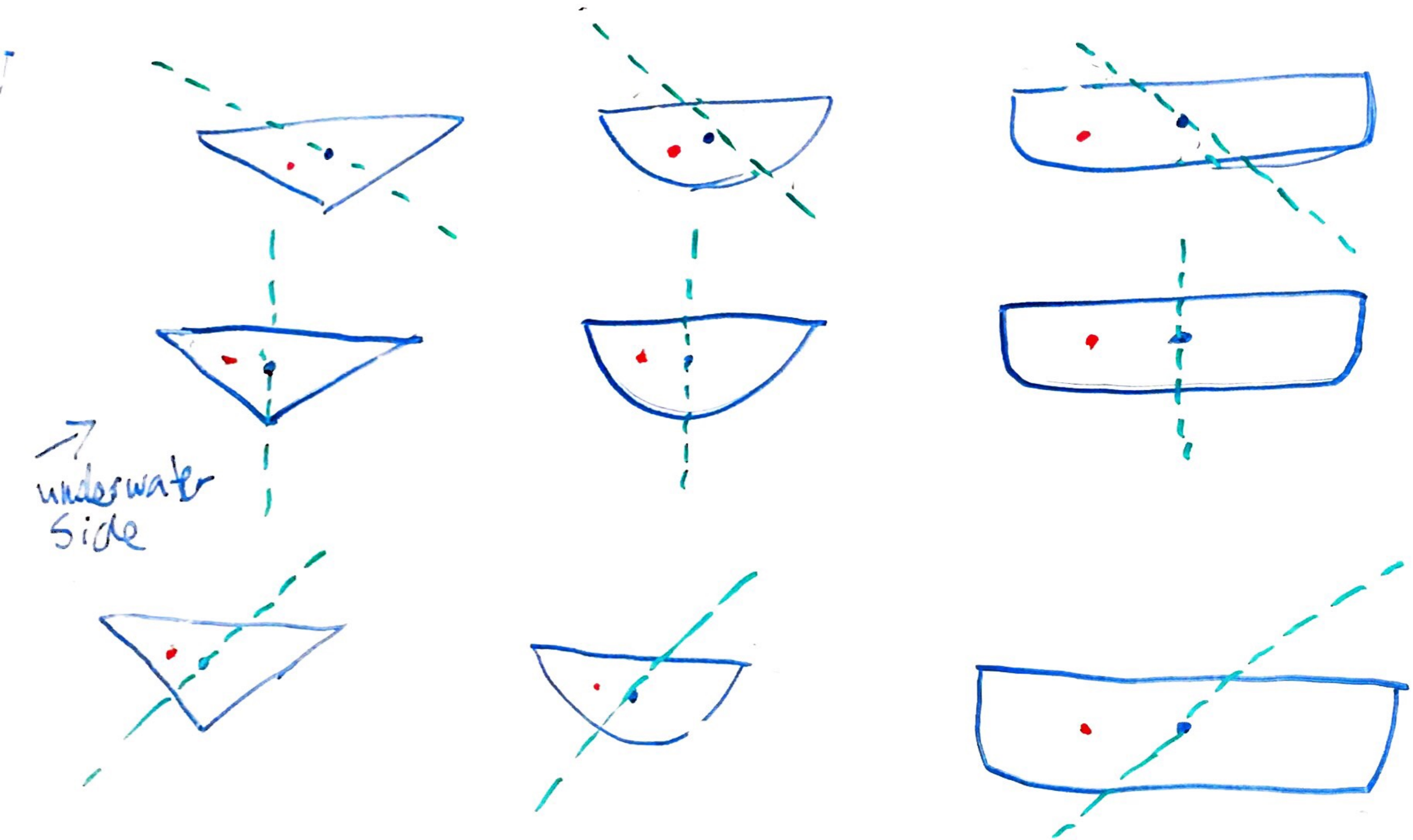

150
100
50


50- K10- 60-

$n = 1$ $n = 2$ $n = \infty$



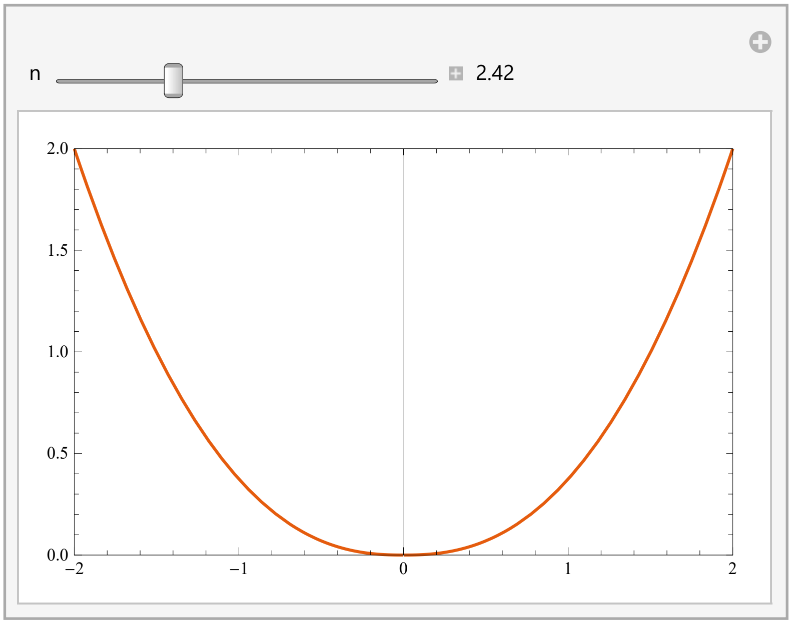
d does depend on the value of n, as n changes the shape of the hull ∴ the water line



Day 3 Boat Calculations

In[20]:=
```
Manipulate[Plot[2 * Abs[x / 2] ^n, {x, -2, 2}, PlotRange → {{-2, 2}, {0, 2}},
  PlotTheme → "Scientific"], {n, 1, 6, Appearance → "Labeled"}]
```

Out[20]=



In[56]:=
```
n = 2
```

Out[56]= 2

In[58]:=
```
N[Integrate[Integrate[500, {y, 2 * Abs[x / 2] ^n, 2} ], {x, -2, 2}]]
```

Out[58]= 2666.67

In[59]:=
```
N[(1 / %) * Integrate[Integrate[500 * y, {y, 2 * Abs[x / 2] ^n, 2} ], {x, -2, 2}]]
```

Out[59]= 1.2

In[60]:=
```
Show[Plot[2 * Abs[x / 2] ^n, {x, -2, 2},
   PlotRange → {{-2, 2}, {0, 2}}, PlotTheme → "Scientific"],
 Plot[%, {x, -2, 2}, PlotRange → {{-2, 2}, {0, 2}}, PlotTheme → "Scientific"] ]
```

Out[60]=