**Formula sheet Final Exam**

**Introduction**

ρ water = 998kg/m3, g =32.2 ft/s2=9.81m/s2, Water γ =9790 N/m3 =62.4 lbf/ft3

P atmosphere = 101 kPa

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**Fluid statics**

Pabs  = Patm + Pgauge



P down = Pup +ɤ h

P=P0 exp [- g (z-z0 ) /RT0]



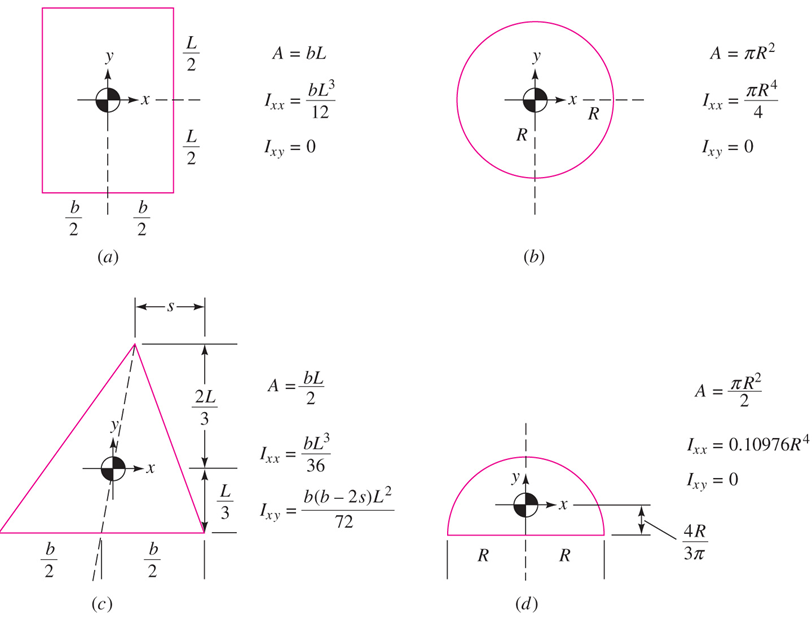
FR = ϒhc A = Pc A ,



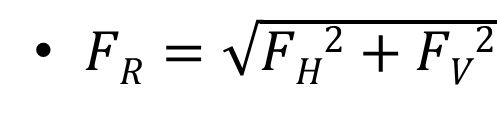
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FRi

FRi



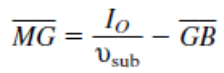
FV = ∫ ϒ dV = ϒ V



,  Angle with horizontal

F B = ϒ Vbody , XB = (1/V) ∫ x dV Which is the centroid of submerged volume.





**Mass conservation**

ρ = P/ (TR)



For Steady flow ∑ m`in  = ∑ m`out

**The Linear Momentum Equation**



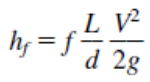
For steady flow

**Energy equation**





hminor = K (V2/2g) = hm

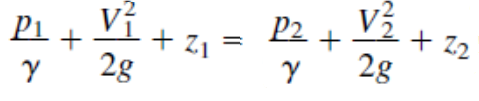
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Re= ρVL/μ = VL/ν

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HGL=z + p/ϒ , EGL = HGL + *V*2/(2*g*)

**Bernoulli’s equation**





Dh = 4 (cross section Area / wetted perimeter) = 4Ac/Pw

*NPSH = hs - hv*

*NPSH = Psys - Pvap*