

Solution to Problem IIIc.2.6:

c This program calculates P and T of a vessel during discharge. The vessel contains air. Calculations in English Units.

```

implicit real*8(a-h,o-z)
data Vol,Area,Cd/100.00,5.454E-3,0.65/
data P,T,Qdot/1000.00,150.00,0.00/
data cp,R,Patm/0.24,53.35,14.70/
data time,dt,ttt/0.0,0.1,17.00/
T=T+460.00
h=cp*T
c=144.00/778.00
b=144.*Cd*Area
open(10,file='tank.out')
am=144.*P*Vol/(R*T)
write(10,4)
1  continue
   i=i+1
   v=R*T/(144.*P)
   dvdh=R/(144.00*P*cp)
   dvdp=-v/P
   dhdt=(Qdot+c*vol*dPdt)/am
   anom=Qdot*dvdh-v*W
   dnom=am*dvdp+c*vol*dvdh
   dPdt=-anom/dnom
   P=P+dPdt*dt
   h=h+dhdt*dt
   am=am-W*dt
   T=h/cp
   W=b*P/sqrt(T)
   if(P.le.Patm.or.am.le.0.0) W = 0.0
   time=time+dt
   Tp=T-460.00
   if(time.lt.1.00) write(10,3) time,P,Tp,am,W
   if(time.gt.1.00.and.i.eq.10) write(10,3) time,P,Tp,am,W
   if(time.gt.1.00.and.i.eq.10) i=0
   if(time.gt.ttt) go to 2
   go to 1
2  continue
3  format(3f10.2,4x,f10.2,2x,f10.2)
4  format(5x'Time',5x,'Pressure',2x,'Temperature',5x,'Mass',6x,
1'Flow Rate',/,5x,' (s) ',3x,' (Psia)',4x,' (F) ',7x,' (lbm)',5x,
2' (lbm/s)')
   stop
end

```