**MAC2233 Project**

**Question 2**

R(x)=5x

C(x)=0.001x^2+1.2x+60

P(x)=5x-(0.001x^2+1.2x+60)=5x-0.001x^2-1.2x-60=-0.001x^2+5x-1.2x-60=-0.001x^2+3.8x-60

R(100)=5(100)=500

C(100)=0.001(100)^2+1.2(100)+60=0.001(10000)+120+60=10+180=190

P(100)=-0.001(100)^2+3.8(100)-60=-0.001(10000)+380-60=-10+320=310

R'(x)=(5x)'=5(1)=5

C'(x)=(0.001x^2+1.2x+60)'=0.001(2x)+1.2(1)+0=0.002x+1.2

P'(x)=(-0.001x^2+3.8x-60)'=-0.001(2x)+3.8(1)-0=-0.002x+3.8

R'(100)=5

C'(100)=0.002(100)+1.2=0.2+1.2=1.4

P'(100)=-0.002(100)+3.8=-0.2+3.8+3.6

**Question 4**

C(x)=0.001x^3+0.07x^2+19x+700

C(25)=0.001(25)^3+0.07(25)^2+19x+700=0.001(15625)+0.07(625)+475+700=15.625+43.75+1175=59.375+1175=1234.375

C(26)-C(25)=(0.001(26)^3+0.07(26)^2+19(26)+700)-(0.001(25)^3+0.07(25)^2+19(25)+700)=0.001(17576)+0.07(676)+494+700)-(0.001(15625)+0.07(625)+475+700)=(17.576+47.32+1194)-(15.625+43.75+1175)=(64.896+1194)-(59.375+1175)=1258.896-(1234.375)=1258.896-1234.375=24.521

C’(27)=(0.001x^3+0.07x^2+19x+700)’=0.001(3x^2)+0.07(2x)+19(1)+0=0.003x^2+0.14x+19=0.003(27)^2+0.14(27)+19=0.003(729)+3.78+19=2.187+22.78=24.967

C’(25)=(0.001x^3+0.07x^2+19x+700)’=0.001(3x^2)+0.07(2x)+19(1)+0=0.003x^2+0.17x+19=0.003(25)^2+0.14(25)+19=0.003(625)+3.5+19=1.875+22.5=24.375

C’(27)-C’(25)=24.967-24.375=0.0592

C(27)=(C(25)\*0.0592)+C(25)=(1234.375\*0.0592)+1234.375=73.075+1234.375=1307.45

**Question 6**

P(x)=-0.006x^3-0.2x^2+900x-1200

P(60)=-0.006(60)^3-0.2(60)^2+900(60)-1200=-0.006(216000)-0.2(3600)+54000-1200=-1296-720+52800=-2016+52800=50784

P(59)-P(60)=(-0.006(59)^3-0.2(59)^2+900(59)-1200)-(-0.006(60)^3-0.2(59)^2+900(59)-1200)=(-0.006(205379)-0.2(3481)+53100-1200)-(-0.006(216000)-0.2(3600)+54000-1200)=(-1232.274-696.2+51900)-(-1296-720+52800)=(-1928.474+51900)-(-2016+52800)=49971.526-(50784)=49971.526-50784=-812.474

P’(60)=(-0.006x^3-0.2x^2+900x-1200)’=-0.006(3x^2)-0.2(2x)+900(1)-0=-0.018x^2-0.4x+900=-0.018(60)^2-0.4(60)+900=-0.018(3600)-24+900=-64.8+876=811.2

P’(61)-P(60)=(-0.018(61)^2-0.4(61)+900)-(-0.018(60)^2-0.4(60)+900)=(-0.018(3721)-24.4+900)-(-0.018(3600)-24+900)=(-66.978+875.6)-(-64.8+876)=808.622-(811.2)=808.622-811.2=-2.578

**Question 7**

R(x)=0.007x^3-0.5x^2+150x

R(26)=0.007(26)^3-0.5(26)^2+150(26)=0.007(17576)-0.5(676)+3900=123.032-338+3900=-214.968+3900=3685.032

R(28)-R(26)=(0.007(28)^3-0.5(28)^2+150(28))-(0.007(26)^3-0.5(26)^2+150(26))=(0.007(21952)-0.5(784)+4200)-(0.007(17576)-0.5(676)+3900)=(153.664-392+4200)-(123.032-338+3900)=(-238336+4200)-(-214.968+3900)=3961.664-(3685.032)=3961.664-3685.032=276.632

R’(26)=(0.007x^3-0.5x^2+150x)’=0.007(3x^2)-0.5(2x)+150(1)=0.021x^2-1x+150=0.021(26)^2-1(26)+150=0.021(676)-26+150=14.196+124=130.196

**Question 19**

M(t)=-2t^2+100t+180

M(5)=-2(5)^2+100(5)+180=-2(25)+500+180=-50+680=630

M(10)=-2(10)^2+100(10)+180=-2(100)+1000+180=-200+1180=980

M(25)=-2(25)^2+100(25)+180=-2(625)+2500+180=-1250+2680=1430

M(45)=-2(45)^2+100(45)+180=-2(2025)+4500+180=-4050+4680=630

M’(t)=(-2x^2+100x+180)’=-2(2x)+100(1)+0=-4x+100

M’(5)=-4(5)+100=-20+100=80

M’(10)=-4(10)+100=-40+100=60

M’(25)=-4(25)+100=-100+100=0

M’(45)=-4(45)+100=-180+100=-80

**Question 21**

P(x)=567+x(36x^0.6-104)=567+36x^1.6-104x=36x^1.6-104x+567

P’(x)=(36x^1.6-104x+567)’=36(1.6x^0.6)-104(1)+0=57.6x^0.6-104

P’(55-1)=P’(55)=57.6(55)^0.6-104=57.6(11.072)-104=637.7347719-104=533.7347719=533.737

**Question 57**

P(x)=0.06x^3-0.5x^2+1.64x+24.76

P’(x)=(0.06x^3-0.5x^2+1.64x+24.76)’=0.06(3x^2)-0.5(2x)+1.64(1)+0=0.18x^2-1x+1.64=0.18x^2-x+1.64

P’(4)-P’(2)=(0.18(4)^2-(4)+1.64)-(0.18(2)^2-(2)+1.64)=(0.18(16)-4+1.64)-(0.18(4)-2+1.64)=(2.88-2.36)-(0.72-0.36)=0.52-(0.36)=0.52-0.36=0.16

P’(8)-P’(6)=(0.18(8)^2-(8)+1.64)-(0.18(6)^2-(6)+1.64)=(0.18(64)-8+1.64)-(0.18(36)-6+1.64)=(11.52-6.4)-(6.48-4.36)=5.12-(2.12)=5.12-2.12=3

**Question 59**

A(x)=C(x)/x

A’(x)=(C(x)/x)’=((C(x))’\*(x))-((x)’\*(C(x))/(x)^2)=((C’(x)\*x)-(1)\*C(x))/x^2)=C’(x)\*x-C’(x)/x^2

**Question 60**

A=2πr^2=2(3.14)r^2=6.28r^2

A’=6.28(2r)=12.56r

A’(100+0.5)=A’(100.5)=2(3.14)(100.5)^2=6.28(10100.25)=63429.57

A’(100)=2(3.14)(100)^2=6.28(10000)=62800

A’(100.5)-A’(100)=63429.57-62800=629.57

629.57/300=2.098566667=2.10→3 extra cans

$30\*3=30\*3=90→$90

**Question 61**

V=4/3πr^3=4/3(3.14)r^3=4.186666667r^3=4.187r^3

V’=4.187(3r^2)=12.56r^2

V’(400)=12.56(400)^2=12.46(160000)=1993600

V’(400+2)=V’(402)=12.56(402)^2=12.56(161604)=2029746.24

V’(402)-V’(400)=2029746.24-1993600=36146.24