P = 15

TC = .5Q^2

Marginal Cost = dy/dx(TC) = Q

Profit Maximizing Output, MC == Marginal Revenue which is the same as price

Q = 15

Profit = TR – TC

TR = price \* quantity = 15 \* 15 = 225

TC = .5(15)^2 = 112.5

Profit = 112.5

TC = 3Q^3 – 18Q^2+30Q+50

MC = 9Q^2 – 36Q + 30

Minimum AVC = MC

TVC: Total Cost = Total Fixed Cost when Output = 0 = 50

Total Cost – Total Fixed Cost = Total Variable Cost

Total Variable Cost = 3Q^3 – 18Q^2 + 30Q

AVC = TVC/Q = 3Q^2 – 18Q + 30

9Q^2 – 36Q = 3Q^2 – 18Q

6Q^2 – 18Q = 0

6Q^2 = 18Q

6Q = 18

Q = 3

Output where Average Variable Cost is equal to Marginal Cost

AVC(3) = $3