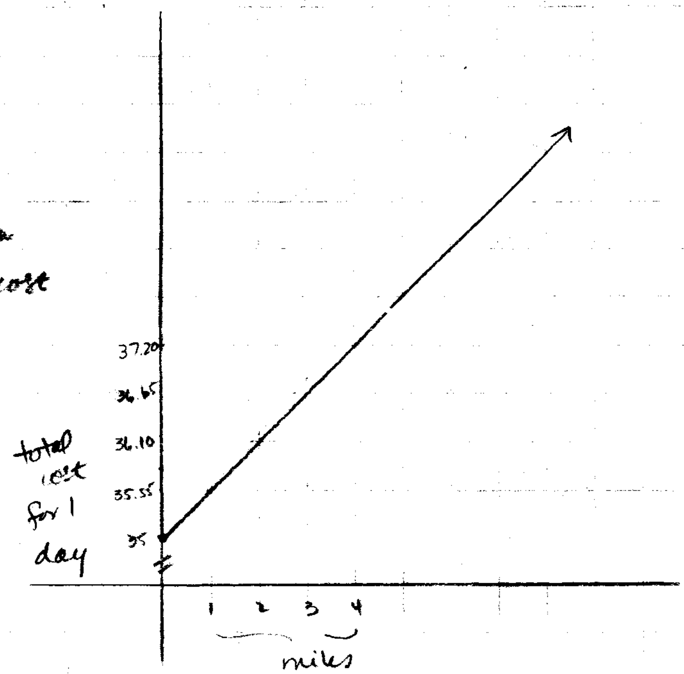
12 pts.

Math 108 HW #3 Answer key

p.38, #36.

a) $C(m) = \$35 + .55m$, where m = # of miles driven and C is total cost



b) $C(50) = 35 + .55(50) = 35 + 27.50$
$= \$62.50$

c) $72 = 35 + .55(m)$
$-35 \quad -35$
$37 = .55m$

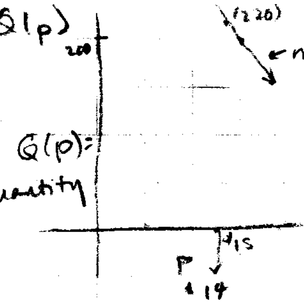
$m = \frac{37}{.55} = 67.2 \sim 67$ miles.

p. 55 #34.

Need: Profit function = Revenue − Cost. Let Q(p) = quantity, p = price per item.
= $\underbrace{\#\text{sold}}$ × price per item − # sold × cost per item

$P(p) = Q(p) \cdot p - Q(p) \cdot 3$

Step 1: find Q(p)



(1, 20)

$m = \frac{20}{-1}$ (each decrease of 1 in p ($\Delta p = -1$) means an increase of 20 in Q(p) ($\Delta Q = 20$), where slope is $\frac{\Delta Q}{\Delta p}$.

- $m = -20$
- one point is (15, 200)
- so $q - 200 = -20(p - 15) = -20p + 300$

$Q(p) = \boxed{q = -20p + 500}$ quantity = demand function.

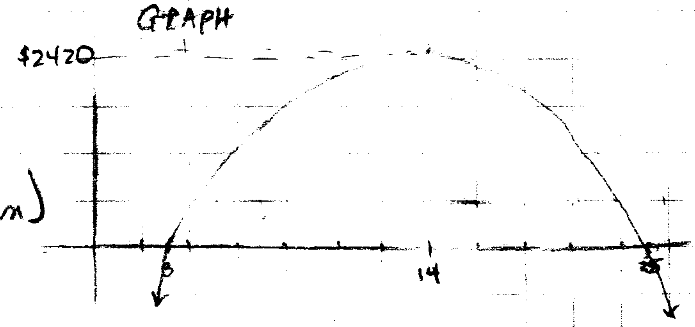
Revenue = $R(p) = p \cdot Q(p) = p(-20p + 500) = -20p^2 + 500p$
Cost = $3 \cdot Q(p) = 3(-20p + 500) = -60p + 1500$
Profit = $R(p) - C(p) = -20p^2 + 500p - (-60p + 1500)$
$= -20p^2 + 500p + 60p - 1500$
$= \boxed{-20p^2 + 560p - 1500 = P(p)}$ ← profit function

$= -20(p^2 - 28p + 75)$
$= -20(p - 25)(p - 3)$

$\boxed{\text{optimal selling price is } \$14}$

(vertex of a parabola that opens down)

GRAPH



#48. (p.56)

a) let x = # of tables sold

$R = 70 \cdot x$

$C = 8000 + 30x$

Break even occurs when $R = C$

$70x = 8000 + 30x$

$40x = 8000$

$x = \frac{8000}{40} = \boxed{200 \text{ tables}}$

b) Profit = Revenue - Cost

$= 70x - (8000 + 30x) = -8000 + 40x$

For Profit to be \$6000: $\$6000 = -8000 + 40x$

$14000 = 40x$

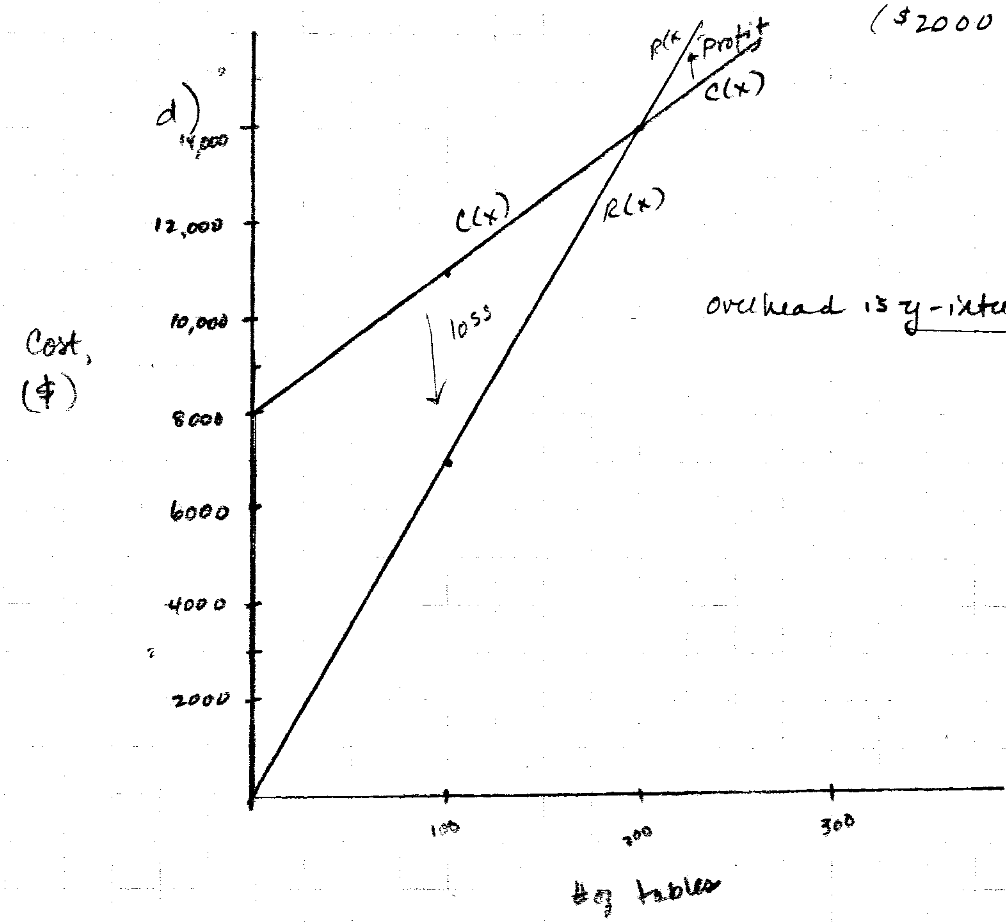
$x = \frac{14000}{40} = \boxed{350 \text{ tables}}$

c) Profit @ 150 tables (will be a loss)

$P(150) = -8000 + 40(150) = -8000 + 6000 = -\$2000$

(\$2000 loss)

d)



overhead is y-intercept of cost function.