Math 2, Winter 2016

QUIZ #2 — WEDNESDAY, JANUARY 20

A small bookstore has a profit function given by

$$p(x) = 60 + 128x - 2x^2,$$

where x is the number of hours they are open each week. What is a reasonable domain for this function? How many hours each week should they be open in order to maximize their profit?

A reasonable domain is $[0, 168]$ because a store cannot be open for negative hours a week, nor can it be open for more hours than there are in a week.

CRITICAL PTS:

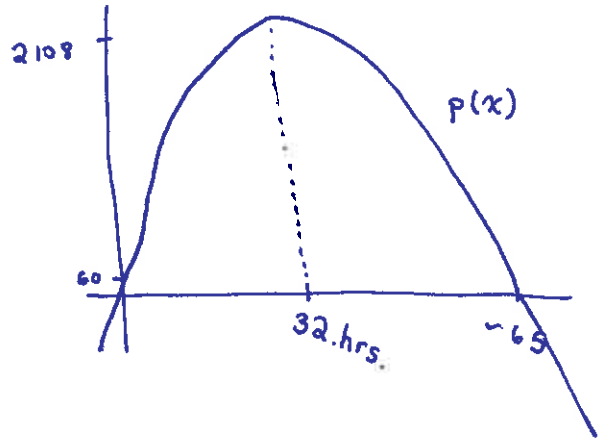
When is $p'(x) = 0$?

$p'(x) = 128 - 4x$

$128 - 4x = 0$

$4x = 128$

$\boxed{x = 32}$



① check endpts and critical pts:

x	$p(x)$
0	60
32	2108 ← absolute max.
168	-$$$ (-34884)

The store should be open for 32 hours a week.

OR

② 2nd Derivative test:

$p''(x) = -4$ ⇒ at the critical point $x = 32$, p is concave down

⇒ $x = 32$ is a local maximum and continuous since p is always concave down, ∩ p is decreasing when $x > 32$, so profit less and $x < 32$, p is increasing, so again, less profit.

OR

* it's just a parabola.
  ⇒ the local max will be absolute max.
  argument.