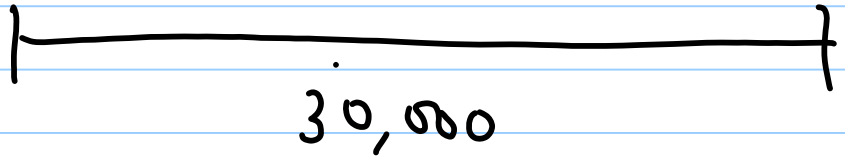
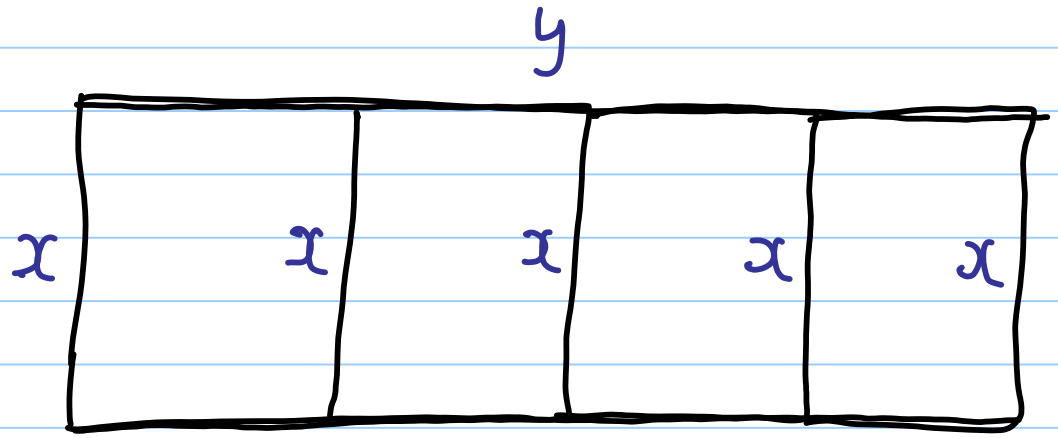
Note Title 10/6/2010

§4.1 #62





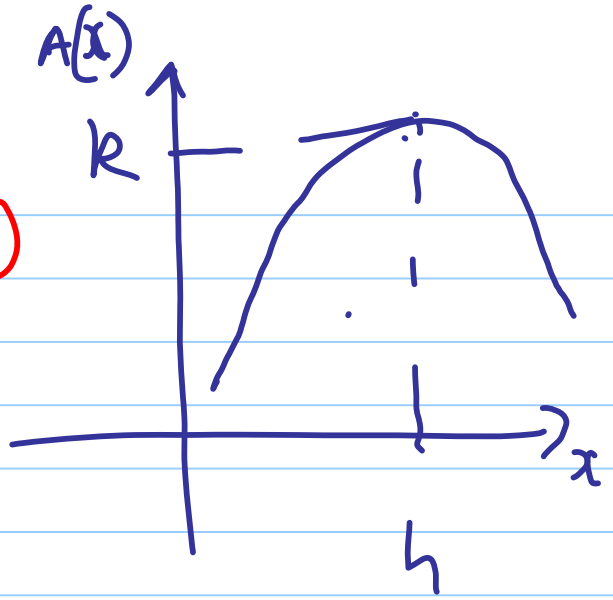
$5x + 2y = 30000$

$y = \frac{30000 - 5x}{2}$

Area $A(x) = xy$

$= x\left(\frac{30{,}000 - 5x}{2}\right)$

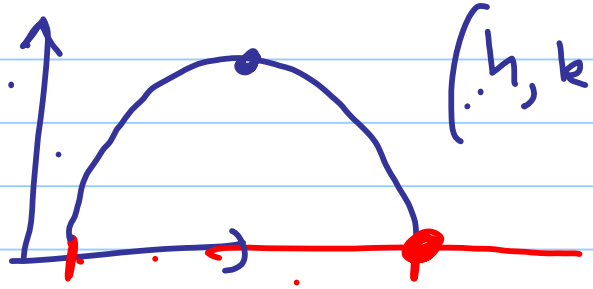
$A(x) = 15{,}000x - \frac{5}{2}x^2$



Quadratic function

parabola opens down $\left(a = -\frac{5}{2} < 0\right)$

#66] $H(x) = -0.0128x^2 + x$

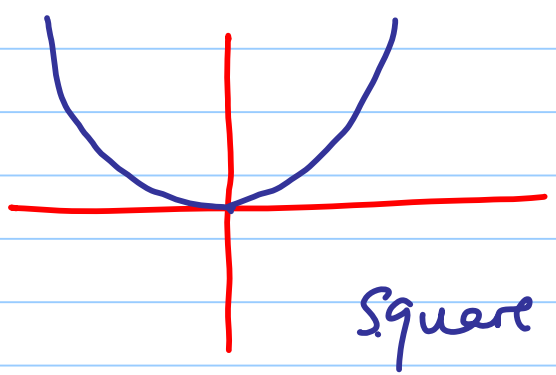


$$h = -\frac{b}{2a} = \frac{-1}{2(-0.01284)}$$

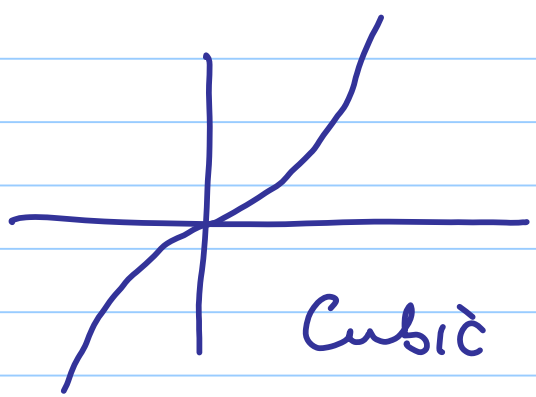
$$= 39.062$$

$$H(39.062) =$$

4.2 Polynomials of Higher Degree



Square function



Cubic

Consider $f(x) = x^2 - 1$

Then

$$f(x) = (x-1)(x+1)$$

- $x-1$ is a factor of $f(x)$.
- $x = 1$ is a solution (zero) of $f(x) = 0$

$x^2 - 1 = 0$

- $(1, 0)$ is an x-intercept of the graph of $f(x)$
- $x = 1$ is a zero of $f(x)$.

Example

Find the real zeros of $f(x) = x^3 + x^2 - 2x$

$$x^3 + x^2 - 2x = 0$$

$$f(x) = x^3 + x^2 - 2x$$

$$= x(x^2 + x - 2)$$

$$= x(x+2)(x-1)$$

The zeros of $f(x)$ are $x = 0$, $x = -2$, $x = 1$

Example

degree = 7

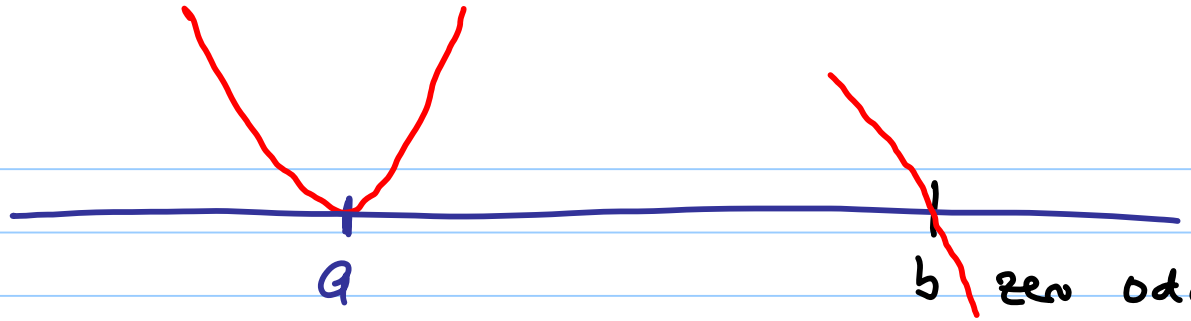
zero: -2 multiplicity 2

0	4
1	1

$$f(x) = (x+2)^2 (x-0)^4 (x-1)^1$$

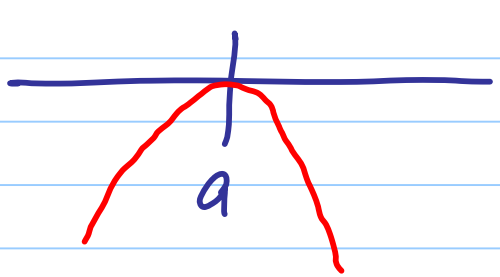
$$= (x+2)^2 x^4 (x-1)$$

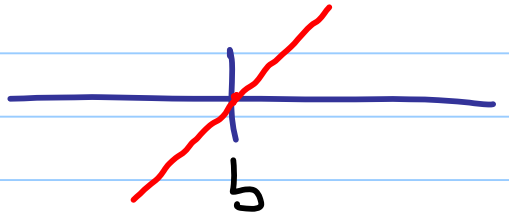
$$p(x) = 100(x+2)^2 x^4 (x-1)$$



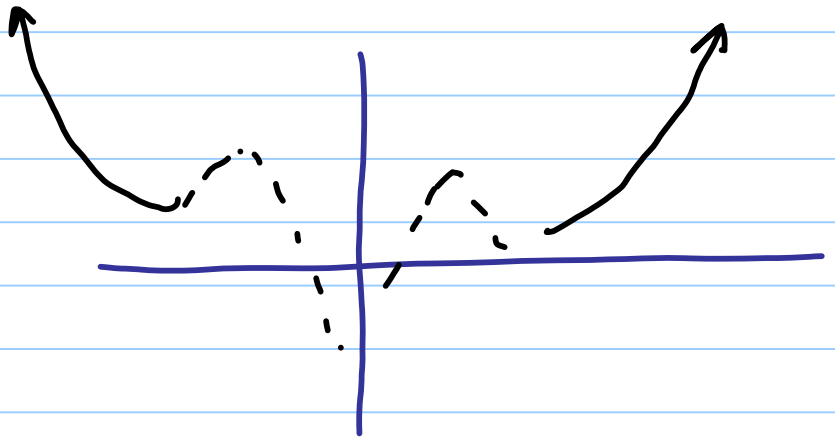
zero odd multiplicity

zero even multiplicity

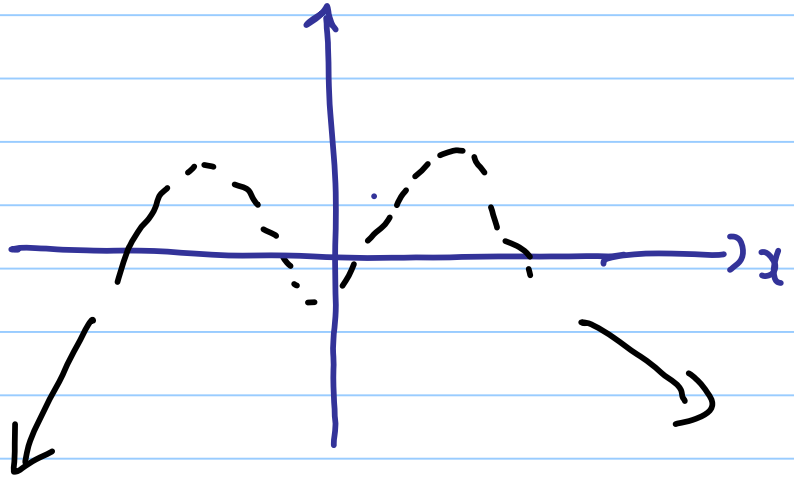




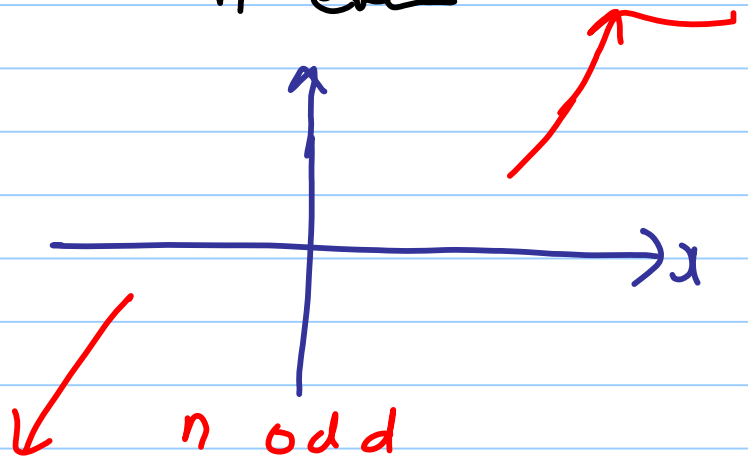
End Behavior



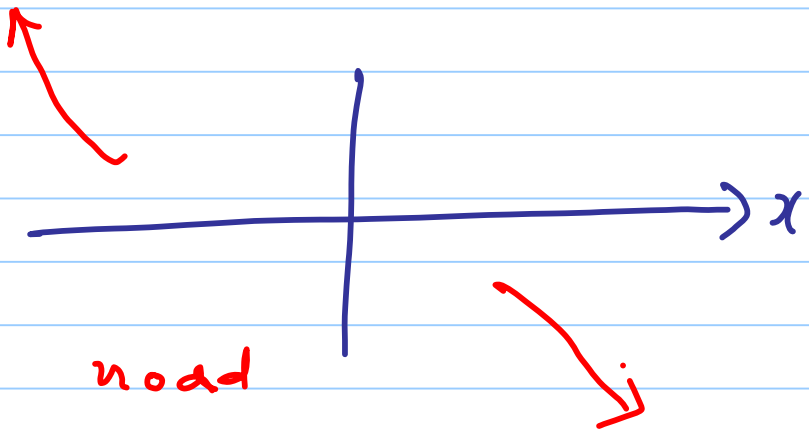
n even



n even



n odd



n odd

$$f(x) = (x+2)^2 x^4 (x-1)$$

$$= x^7 + \cdots$$