

$$1) y = -2x^2(x-3)(x+4)^2$$

LC: -
Deg: odd (5) } EB: $\uparrow\downarrow$

Roots: 0 (mult 2)
3 (mult 1)
-4 (mult ~~1~~ 2)



$$2) f(x) = x^4 - 2x^3 - 3x^2 = x^2(x^2 - 2x - 3) = x^2(x-3)(x+1)$$

LC: +
Deg: even (4) } EB: $\uparrow\uparrow$

Roots: 0 (mult 2)
3 (mult 1)
-1 (mult 1)



$$3) f(x) = 4x^3(4-x^2)^2(5-5x)^3$$

$$4x^3 \cdot (-x)^2 \cdot (-5x)^3 = 4x^3 \cdot x^2 \cdot -125x^3 = -500x^8$$

LC: - Deg: even

EB: $\downarrow\downarrow$

D

$$4) y = 5x^3 + 6x^2 - 45x - 54$$

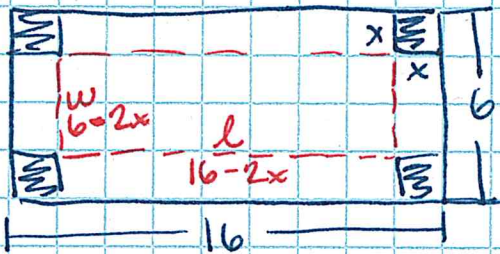
$$\begin{array}{r} -3 \overline{) 5 \quad 6 \quad -45 \quad -54} \\ \underline{15 \quad -15 \quad 27 \quad 54} \\ 5 \quad -9 \quad -18 \quad 0 \end{array}$$

$$5x^2 - 9x - 18 \\ (5x + 6)(x - 3)$$

Roots: -3 (mult 1)
3 (mult 1)
 $-\frac{6}{5}$ (mult 1)

B

5.



$$V = lwh$$

$$V = (16 - 2x)(6 - 2x)x$$

Use Calc to find max pt.

$$x = 1\frac{1}{3} = \frac{4}{3} \quad y = 59.26$$

$$l = 13.33 \text{ cm}$$

$$w = 3.33 \text{ cm}$$

$$h = 1.33 \text{ cm}$$

$$\text{Max Volume} = 59.26 \text{ cm}^3$$

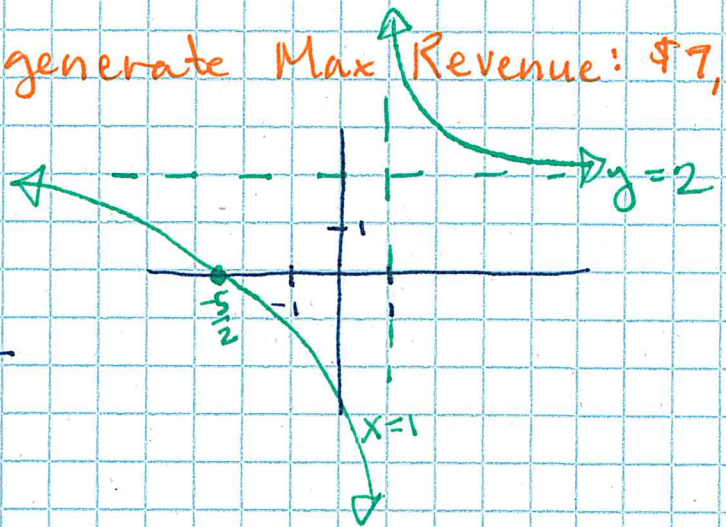
6. $R = (20 + 5x)(300 - 30x)$

Use Calc to find max pt.

$$x = 3 \quad y = 7350$$

Price: \$35 will generate Max Revenue: \$7,350

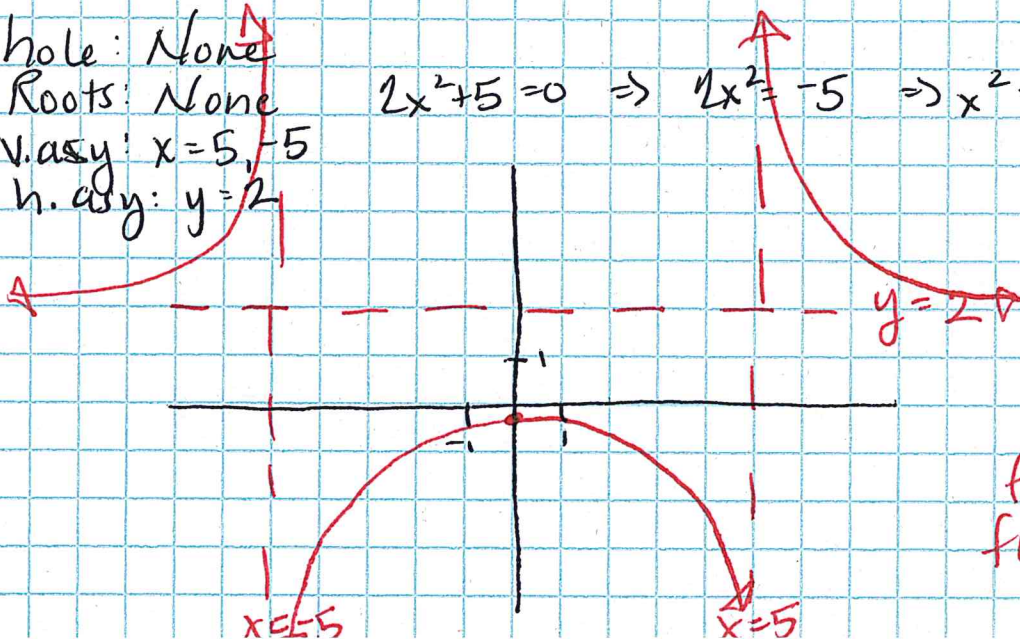
7. $y = \frac{2x+5}{x-1}$

holes: None
Roots: $x = -\frac{5}{2}$ v. asy: $x = 1$
h. asy: $y = 2$ 

8. $y = \frac{2x^2+5}{x^2-25} = \frac{2x^2+5}{(x+5)(x-5)}$

hole: None
Roots: None
v. asy: $x = 5, -5$
h. asy: $y = 2$

$$2x^2 + 5 = 0 \Rightarrow 2x^2 = -5 \Rightarrow x^2 = -\frac{5}{2} \Rightarrow x \text{ is } \text{imag.}$$



for Middle Section:

$$f(0) = \frac{0+5}{0-25} = -\frac{1}{5}$$

9) $y = \frac{x^3}{x^2 - 9}$ $372 \therefore$ slant asymptote

$$x^2 - 9 \overline{) \begin{array}{r} x^3 + 0x^2 + 0x + 0 \\ -x^3 + 9x \\ \hline 9x \end{array}}$$

9x ← remainder ignore.

$y = x$ A

10. $y = \frac{-3}{x+7} + 8$ D: all reals except -7
R: all reals except 8

C

11. $(2+4i) + 6i = \boxed{2+10i}$

12. $(-6-3i) - (5-9i)$
 $-6-3i-5+9i$
 $\boxed{-11+6i}$

13. $(8-2i)(5+3i)$

$40 - 10i + 24i - 6i^2$
 $40 + 14i - 6(-1)$

$\boxed{46+14i}$

14. $\frac{9+i}{7-2i} \cdot \frac{7+2i}{7+2i}$

$\frac{63+7i+18i+2i^2}{49-4i^2}$

$\frac{63+25i+2(-1)}{49-4(-1)}$

$\frac{61+25i}{53}$

or

$\frac{61}{53} + \frac{25}{53}i$

15. Complex roots come in pairs so what is possible is:

- 0 complex 5 real
- 2 complex 3 real
- 4 complex 1 real

B, C, D

A doesn't belong/not possible.