M 191 Lect #16 3-16-11

Stewart's steps A–D for graphing.

$y = f(x) = \dfrac{x^2+5x}{x+3}$

A - Domain
B - Intercepts
C - Symmetry
D - Asymptotes

A - Domain of f
is all $x \in \mathbb{R}$ except $x = -3$

B - Intercept

x	y
0	0
0	0
-5	0

$f(0) = \dfrac{0}{3} = 0 \leftarrow$ y intercept

Numer $\overset{\text{set}}{=} 0$ $x^2+5x \overset{\text{set}}{=} 0$

$(x)(x+5) = 0$

$x = 0$ $x = -5$

are the two x-intercepts

C - Symmetry

$f(-x) \overset{\text{simplify}}{=} f(x)$

then symm about y axis

$f(-x) \overset{\text{simplify}}{=} -f(x)$

then sym through origin

No symmetry

D Asymptotes

$$y = f(x) = \frac{x^2+5x}{x+3}$$

For vert asy Denom $\stackrel{\text{set}}{=} 0$

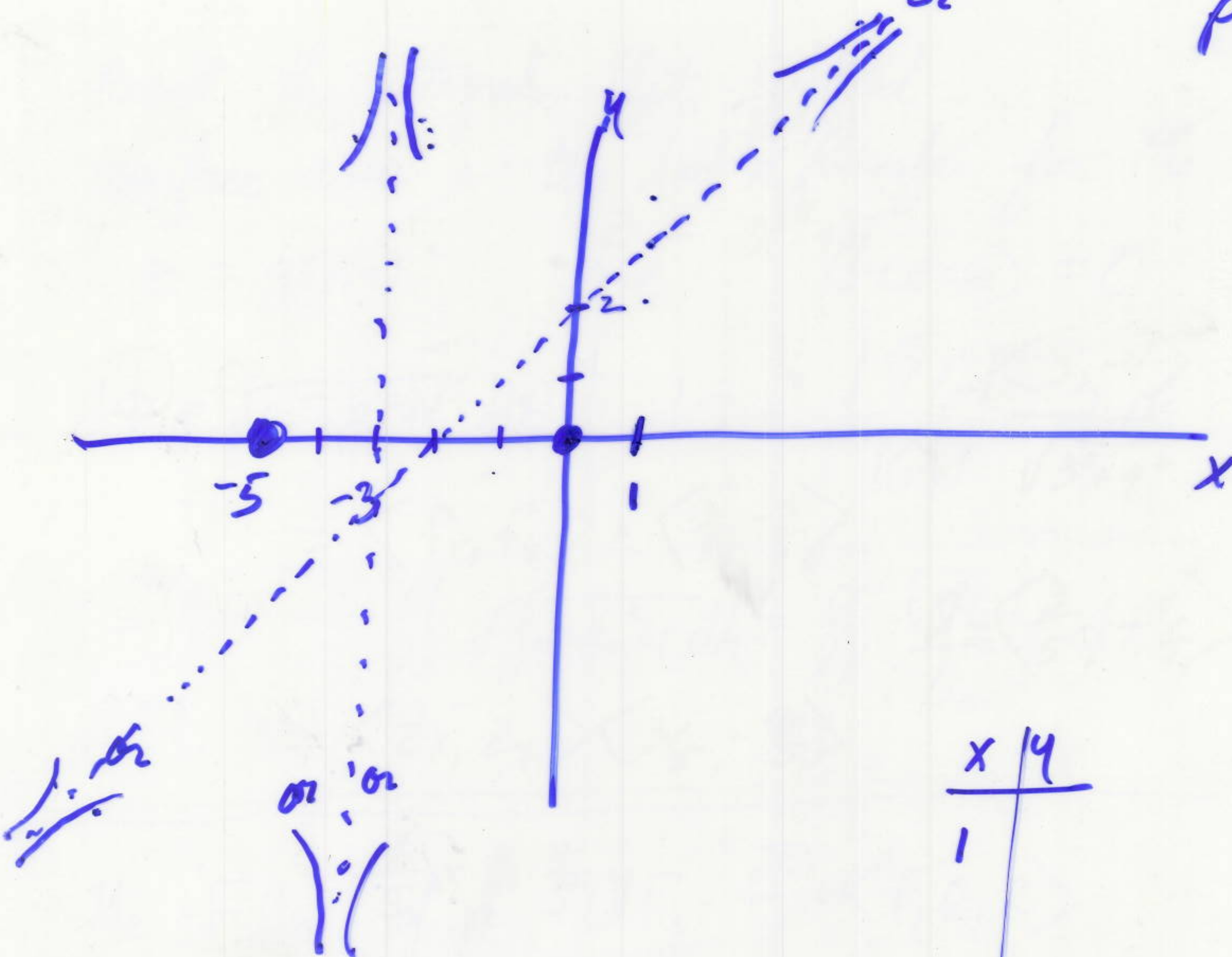
$x+3 \stackrel{\text{set}}{=} 0 \Rightarrow x=-3$ is eqn of vert asy.

For non-vert asy use long div

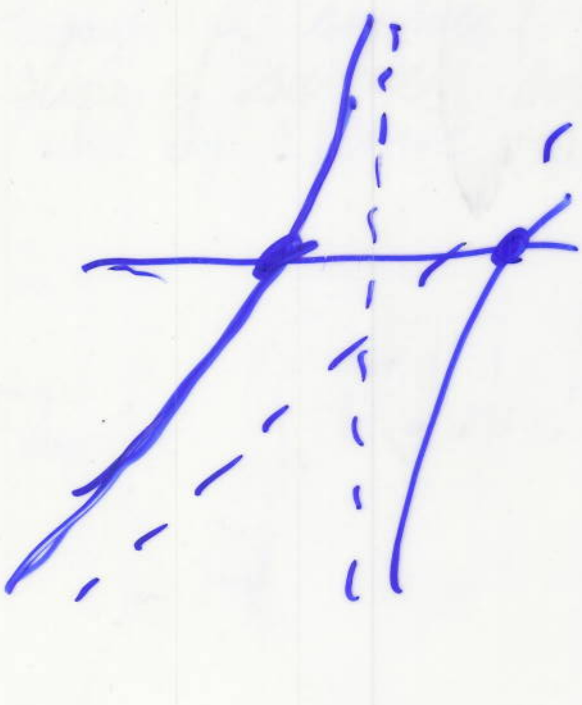
$$\begin{array}{r l}
 & x + 2 \\
x+3 & \overline{)\, x^2+5x+0} \\
\text{subtr} & \underline{x^2+3x} \\
 & 2x+0 \\
\text{Subtr} & \underline{2x+6} \\
 & -6
\end{array}$$

$$f(x) = \frac{x^2+5x}{x+3} = \underbrace{x+2}_{} + \frac{-6}{x+3}$$

$y = x+2$ is the eqn of non vert asy



x	y
1	



my guess

§ 4.10 Antidifferentiation

$\mathcal{F}$	F	f
F	$f = F'$	$f' = F''$
s	$s' = v$	$s'' = a = v'$
f	f'	f''
y	y'	y''
x^4+5x+7	$4x^3+5+0$	$12x^2+0+0$
$\frac{1}{5}x^5+20 \rightarrow$	$\frac{1}{5}\cdot 5x^4 = x^4+0 \rightarrow$	$4x^3+0+0$
$\frac{1}{4}x^4-14 \rightarrow$	$\frac{1}{4}\cdot 4x^3 = x^3+0 \rightarrow$	$3x^2+0+0$
$\frac{1}{3}x^3+C \leftarrow$	$= x^2+0 \rightarrow$	$2x+0+0$
$\frac{x^7}{7}+3\frac{x^5}{5}+C \leftarrow$	$x^6+3x^4 \rightarrow$	$6x^5+12x^3+0+0$

Ji.	F	f
$\frac{9}{8}\frac{x^9}{9}+\frac{1}{3}\frac{x^7}{7}+C_1x+C_2$ $=\frac{x^9}{8}+\frac{x^7}{21}+C_1x+C_2$	$9\frac{x^8}{8}+2\frac{x^6}{6}+C_1+0$	$9x^7+2x^5+0+0$

s	v	a
$s=6\frac{t^3}{3}+8\frac{t^2}{2}-4\frac{t^1}{1}+C_2$ $s=2t^3+4t^2-4t+C_2$ $7 \quad 1 \quad 1 \quad 1$ $7=2+4-4+C_2$ $7=2+C_2$ $5=C_2$ $s=2t^3+4t^2-4t+5$	$12\frac{t^2}{2}+8t+C_1$ $v=6t^2+8t+C_1$ $10 \quad 1 \quad 1$ $10=14+C_1$ so $C_1=-4$ $v=6t^2+8t-4$ $t=1 \Rightarrow s=7$ Initial Condition	$12t+8$ $t=1 \Rightarrow v=10$ We solved the IVP initial value problem $s''=12t+8$, $v(1)=10$, $s(1)=7$

Cheapest Can Problem

$V = \pi r^2 \cdot h$

A can with volume 120 in^3 is to be constructed with the least value of material. $6 \frac{\$}{in^2}$ for top & bottom

$4 \frac{\$}{in^2}$ for side

$\text{Cost} = \text{Cost}_T + \text{Cost}_B + \text{Cost}_S$

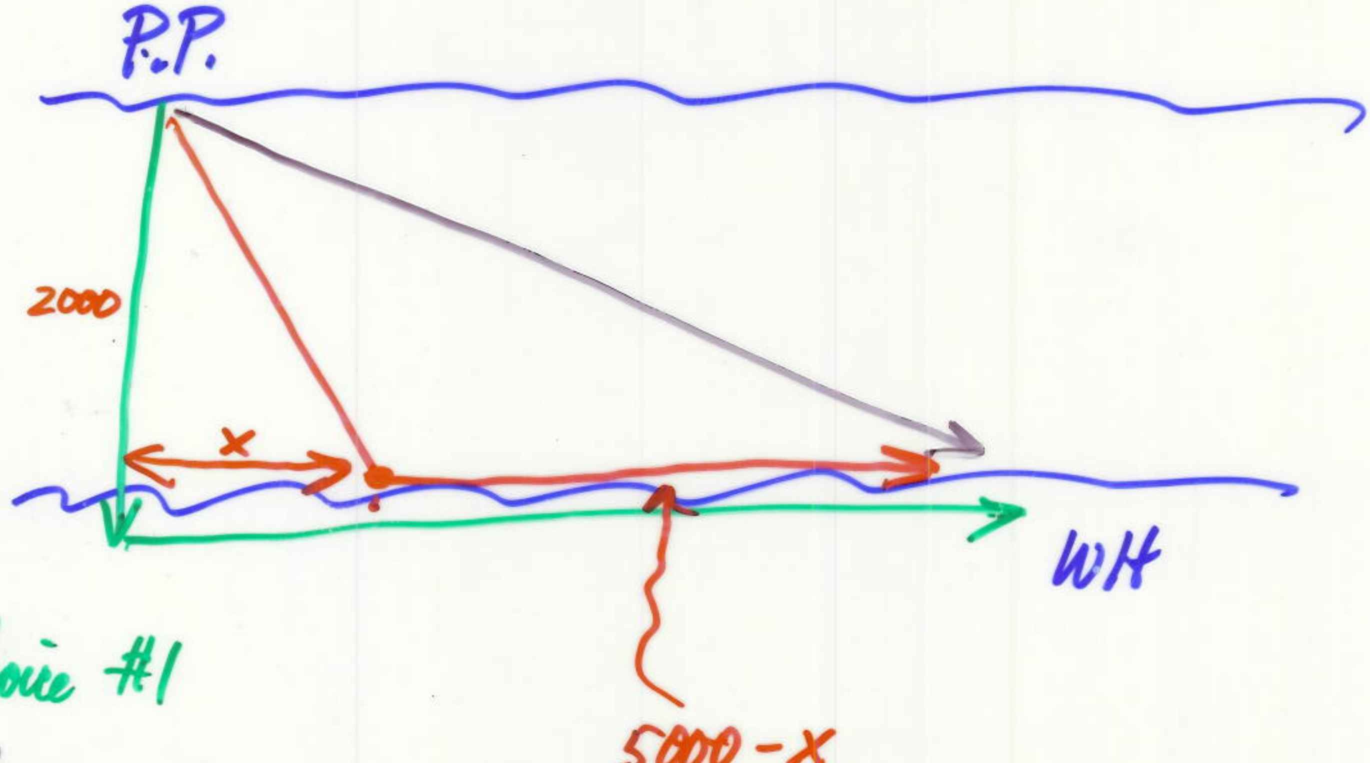
$\text{Cost} = 6 \frac{\$}{\cancel{in^2}} \cdot \pi r^2 \cancel{in^2} + 6\pi r^2 + 4 \cdot 2\pi r \cdot h$

Obj Fcn

Constraint is $120 = \pi r^2 h$

Solve for this h and plug into this h

Cheapest line problem



Choice #1

Choice #2

Choice #3