Week 7 Worksheet Tuesday

Instructions. Discuss with your group mates and do the following problems. You are not expected to finish all the problems. :)

Today's Topic:
1. Limit Computing (mainly focus on "∞" type, i.e. asymptote type)
2. Graphing Related

Find the following limit, indicating $\pm\infty$ when applicable.

1. $\lim_{x\to\infty} \frac{3x+5}{4-x}$

$$= \lim_{x\to\infty} \frac{3+\frac{5}{x}}{\frac{4}{x}-1}$$

$$= -3$$

2. $\lim_{x\to-\infty} \frac{-x^{2017}-9x^3+27}{x^{2016}+2x^{2017}-221}$

$$= \lim_{x\to-\infty} \frac{-1-\frac{9x^3}{x^{2017}}+\frac{27}{x^{2017}}}{\frac{1}{x}+2-\frac{221}{x^{2017}}}$$

$$= \frac{1}{-2}$$

3. $\lim_{x\to+\infty} \frac{2}{x^3}$

$$= 0$$

4. $\lim_{t\to-\infty} \frac{t^2+2}{t^3+t^2+1}$

$$= \lim_{t\to-\infty} \frac{t^2(1+\frac{2}{t^2})}{t^3(1+\frac{1}{t}+\frac{1}{t^2})}$$

$$= \lim_{t\to\infty} \frac{1+\cancel{\frac{2}{t^2}}^{\nearrow 0}}{t(1+\cancel{\frac{1}{t}}^{\nearrow 0}+\cancel{\frac{1}{t^2}})^{\nearrow 0}} = 0$$

5. $\lim_{x\to+\infty} \frac{\sqrt{9x^2+3x}}{2x+1}$

$$= \lim_{x\to\infty} \frac{\sqrt{x^2}\sqrt{9+\frac{3}{9x}}}{x(2+\frac{1}{x})}$$

$$= \lim_{x\to\infty} \frac{\cancel{x}\sqrt{9}}{\cancel{x}\ 2}$$

$$= \frac{3}{2}$$

6. $\lim_{x\to-\infty} \frac{\sqrt{9x^2+3x}}{2x+1}$

$$= \lim_{x\to\infty} \frac{\sqrt{x^2}\sqrt{9+\frac{3}{9x}}}{x(2+\frac{1}{x})}$$

$$= \lim_{x\to\infty} \frac{-\cancel{x}\sqrt{9}}{\cancel{x}\cdot 2}$$

$$= -\frac{3}{2}$$

Key:

☆ ☆

$$\boxed{\sqrt{x^2} = \begin{cases} x & x>0 \\ -x & x<0 \end{cases}}$$

7. $\lim_{x\to -3^+} \frac{\overset{-}{x+2}}{\underset{+}{x+3}}$ DNE

$= -\infty$

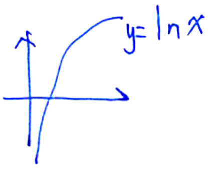
8. $\lim_{x\to 1^-} \frac{\overset{+}{1}}{\underset{-\quad +}{(x-1)x^4}}$ DNE

$= -\infty$

9. $\lim_{x\to 0} \frac{1}{\underset{-\quad +}{(x-1)x^4}}$ DNE

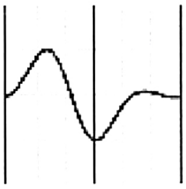
$= -\infty$

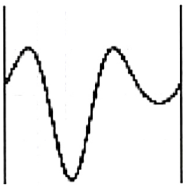
10. $\lim_{x\to 2^+} \ln\left(x^2-4\right)$



$= -\infty$

$f(x)$


A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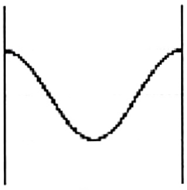
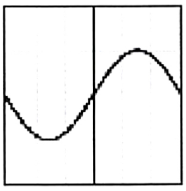

C

$f'(x)$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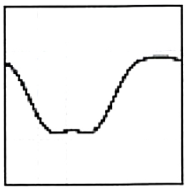
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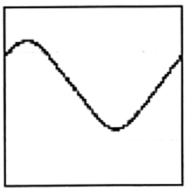
F

4.3 problem #34
4.3 problem #38

f(x)	A	C	F
f'(x)	B	D	E