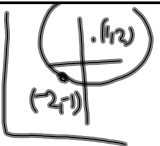


18.) a) center is  $(1, 2)$ .  
 Passes through  $(-2, -1)$



$$(x-1)^2 + (y-2)^2 = r^2$$

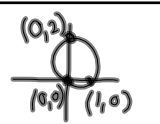
$$(-2-1)^2 + (-1-2)^2 = r^2$$

$$18 = r^2$$

$$(x-1)^2 + (y-2)^2 = 18$$

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b)  $(x-h)^2 + (y-k)^2 = r^2$



- 1)  $(0, 0)$   $(0-h)^2 + (0-k)^2 = r^2$
- 2)  $(1, 0)$   $(1-h)^2 + (0-k)^2 = r^2$
- 3)  $(0, 2)$   $(0-h)^2 + (2-k)^2 = r^2$

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- 1.)  $h^2 + k^2 = r^2$
- 2.)  $(1-h)^2 + k^2 = r^2$
- 3.)  $h^2 + (2-k)^2 = r^2$

---

subtract ① - ②

To subtract is to add  
the opposite

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$$\begin{array}{r} \textcircled{2} \quad h^2 - 2h + 1 + k^2 = r^2 \\ - \textcircled{1} \quad -h^2 \quad \quad -k^2 = -r^2 \\ \hline -2h + 1 = 0 \\ 1 = 2h \\ \textcircled{\frac{1}{2} = h} \end{array}$$

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$$\begin{array}{r} \textcircled{3} \quad h^2 + k^2 - 4h + 4 = r^2 \\ - \textcircled{1} \quad -h^2 - k^2 = -r^2 \\ \hline -4h + 4 = 0 \\ 4 = 4h \\ \textcircled{1 = h} \end{array}$$

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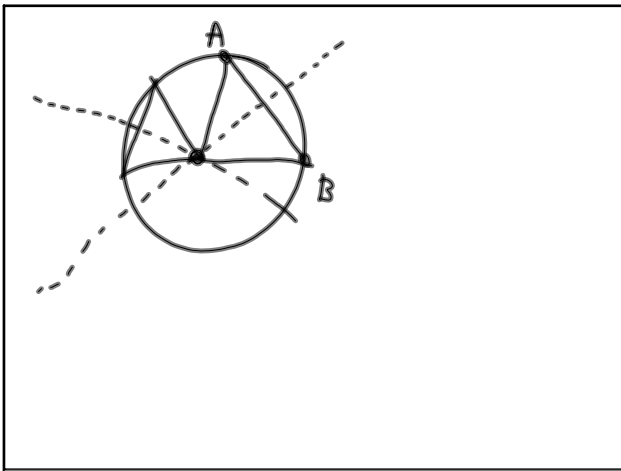
For  $r_1$

- ①  $h^2 + k^2 = r^2$

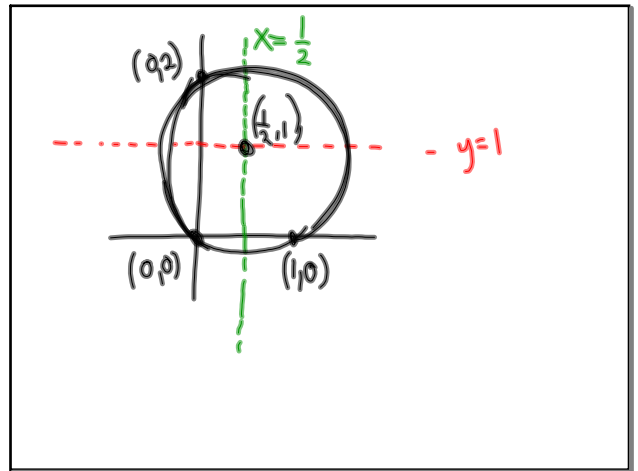
$$\left(\frac{1}{2}\right)^2 + 1^2 = \frac{5}{4} = r^2$$

$$(x - \frac{1}{2})^2 + (y-1)^2 = \frac{5}{4}$$

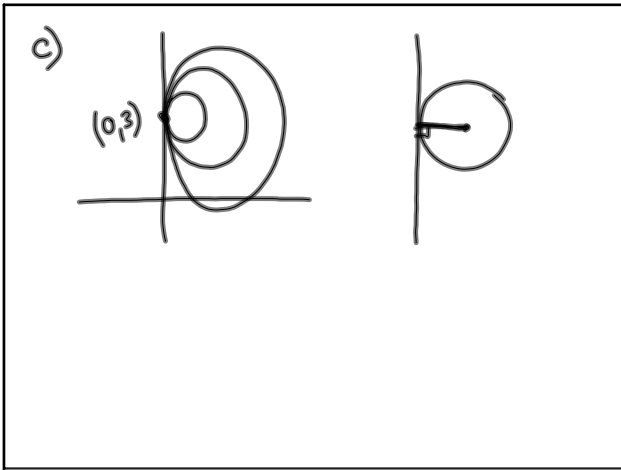
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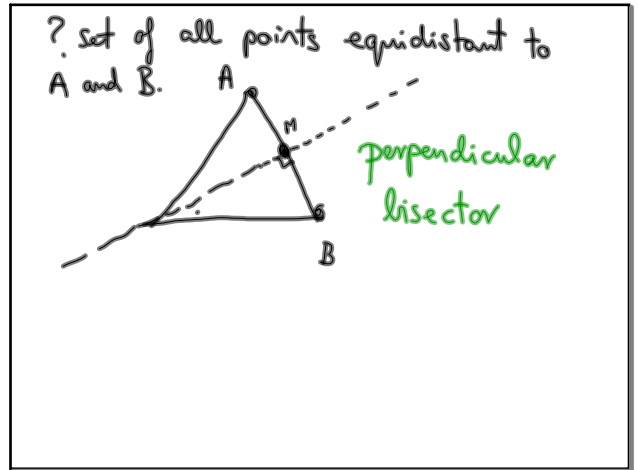
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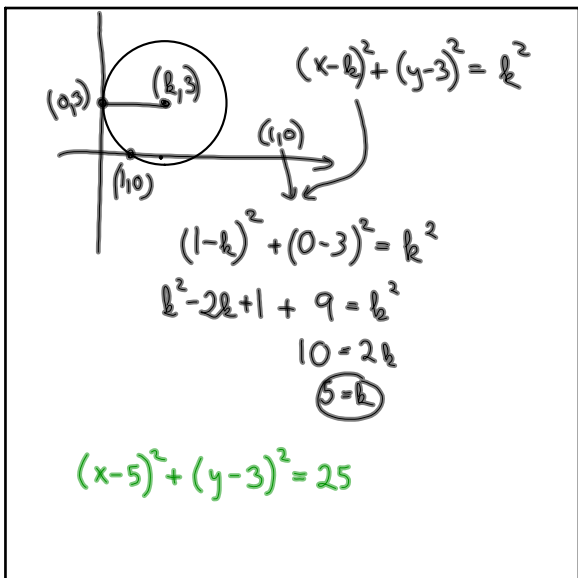
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Jan 23-6:27 PM



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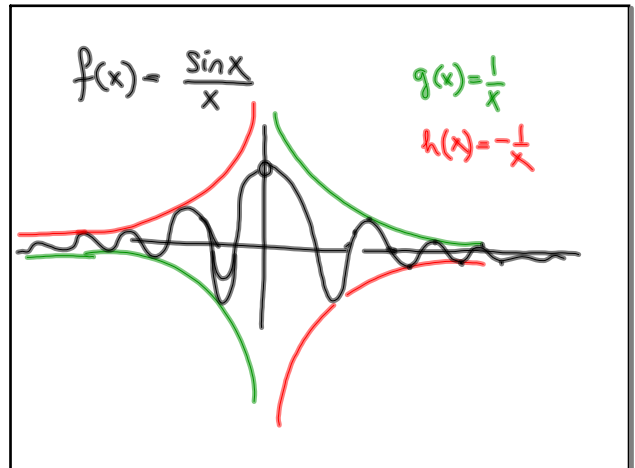
Big ideas in calculus

- Limits
- Differentiation
- Integrals

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Limits at a point and  
limits at infinity and negative  
infinity.

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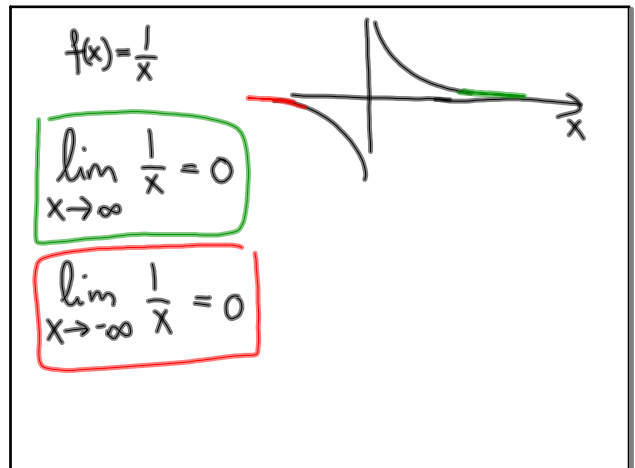
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limit at a number:  
in this case,

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

○ A famous limit, we'll prove it  
later.

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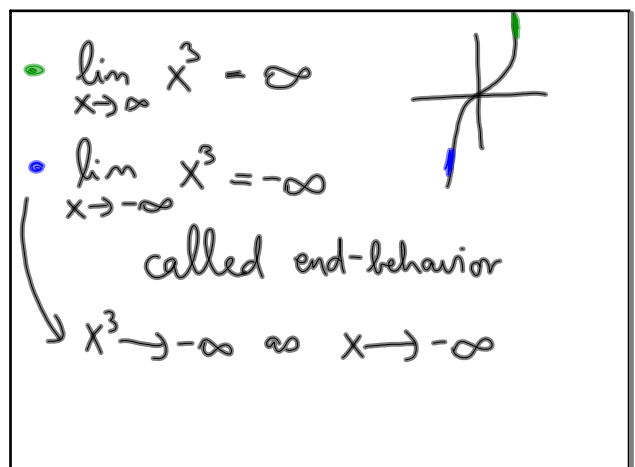


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$$\lim_{x \rightarrow \infty} \frac{\sin x}{x} = 0$$

from picture

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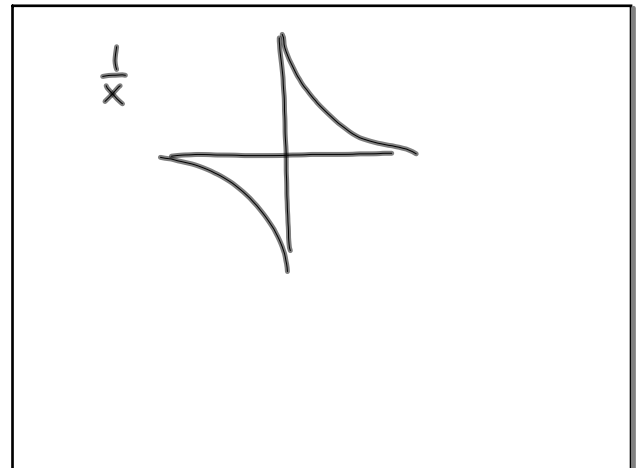


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$$\lim_{x \rightarrow \infty} \frac{x+1}{x} = \lim_{x \rightarrow \infty} 1 + \frac{1}{x} = 1$$

$$\lim_{x \rightarrow 0} \frac{x+1}{x} \text{ postponed}$$

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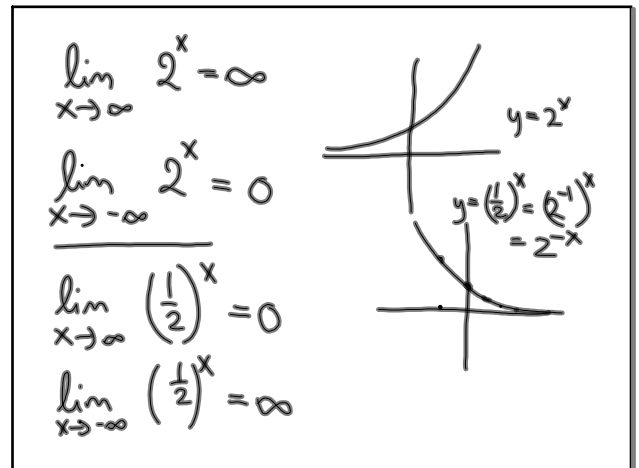


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$$\lim_{x \rightarrow \infty} \frac{x+1}{x} = 1$$

$$\frac{x+1}{x} \rightarrow 1 \text{ as } x \rightarrow \infty$$

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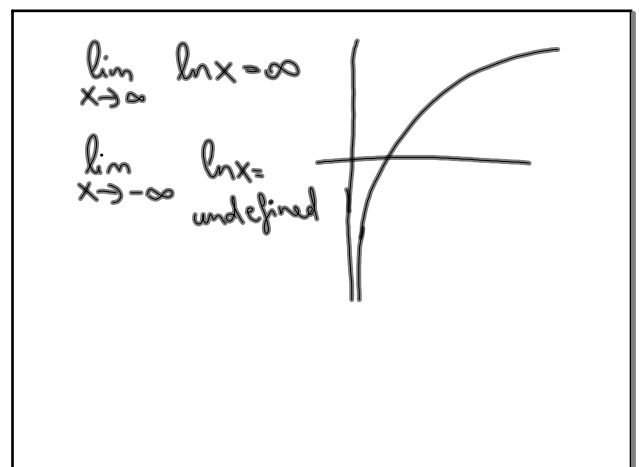
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$$\lim_{x \rightarrow \infty} \sqrt{x} = \infty$$

$$\lim_{x \rightarrow -\infty} \sqrt{x} = \text{undefined}$$

$$\lim_{x \rightarrow \infty} \sin x = \text{undefined}$$

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Monomials:  $-2 \cdot x \cdot x \cdot x \cdot x$

$$\lim_{x \rightarrow \infty} -2x^4 = -\infty$$


$$\lim_{x \rightarrow -\infty} -2x^4 = -\infty$$

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①  $\frac{1}{100}x^4$  

positive, even


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②  $\lim_{x \rightarrow \infty} 3x^7 = \infty$  

$$\lim_{x \rightarrow -\infty} 3x^7 = -\infty$$

positive coeff., odd degree


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③  $\lim_{x \rightarrow \infty} -\frac{1}{7}x^{15} = -\infty$  

$$\lim_{x \rightarrow -\infty} -\frac{1}{7}x^{15} = \infty$$

negative coefficient  
odd degree

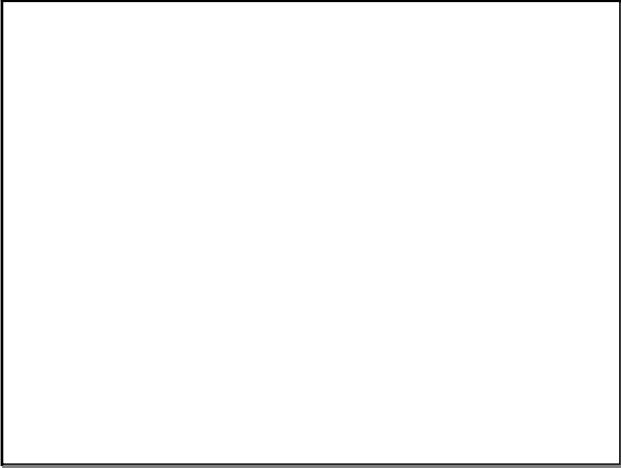
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④  $\lim_{x \rightarrow \infty} -\frac{2}{7}x^8 = -\infty$  

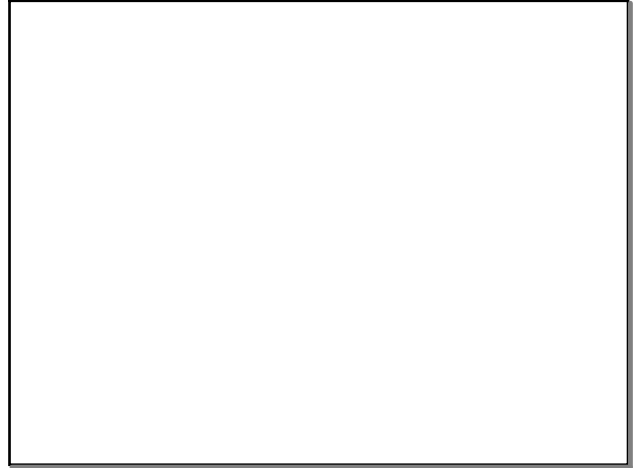
$$\lim_{x \rightarrow -\infty} -\frac{2}{7}x^8 = -\infty$$

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