(42) $\lim_{x\to 0} \frac{\sin x}{x^2} = \lim_{x\to 0} \frac{\cos x}{2x} = \infty$

$\frac{0}{0}$ $\frac{1}{0}$

---

(11) $\lim_{x\to 0} \frac{\sin x - x}{x^3} = \lim_{x\to 0} \frac{\cos x - 1}{3x^2} = \lim_{x\to 0} \frac{-\sin x}{6x} = \lim_{x\to 0} \frac{-\cos x}{6} = \frac{-1}{6}$

$\frac{0}{0}$ $\frac{0}{0}$ $\frac{0}{0}$

---

(17) $\lim_{x\to 0} \frac{x\cos x - \sin x}{x(\sin x)^2} = \lim_{x\to 0} \frac{\cos x - x\sin x - \cos x}{\sin^2 x + x(2)(\sin x)(\cos x)}$

$\frac{0}{0}$

$= \lim_{x\to 0} \frac{-x\sin x}{\sin^2 x + 2x\sin x\cos x}$

$= \lim_{x\to 0} \frac{-x}{\sin x + 2x\cos x} = \lim_{x\to 0} \frac{-1}{\cos x + 2\cos x - 2x\sin x} = \frac{-1}{3}$

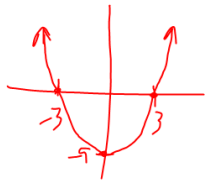
$\frac{0}{0}$

---

(15) $\lim_{x\to\infty} \frac{x^3}{e^x} = \lim_{x\to\infty} \frac{3x^2}{e^x} = \lim_{x\to\infty} \frac{6x}{e^x} = \lim_{x\to\infty} \frac{6}{e^x} = \frac{6}{\infty} = 0$

$\frac{\infty}{\infty}$ $\frac{\infty}{\infty}$ $\frac{\infty}{\infty}$

ex. 1 a. $f(x) = x^2 - 9$ on $(-\infty, \infty)$

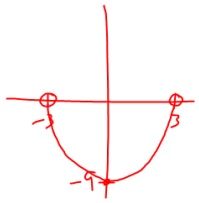


abs. min : $x = 0$ $(0, -9)$
min value = -9

no abs. max

---

b. $f(x) = x^2 - 9$ on $(-3, 3)$



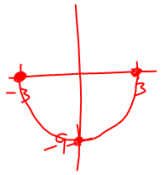
abs. min : $x = 0$ $(0, -9)$
value : -9

no abs. max

x	y
2.9	-.59
2.99	-.059

---

c. $f(x) = x^2 - 9$ on $[-3, 3]$

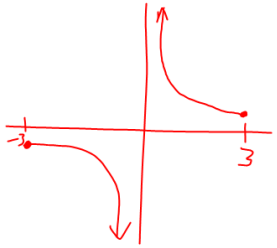


abs. min : $x = 0$ $(0, -9)$
value : -9

abs. max : $x = 3, x = -3$

---

ex. 2 $f(x) = \frac{1}{x}$ $[-3, 3]$



no abs. min

no abs. max

ex. 3 $f(x) = \frac{1}{x}$ $[1, 3]$

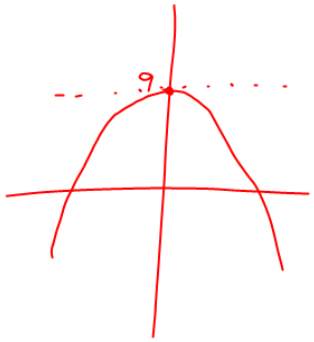
$f'(x) = 0$ $f'(x)$ is undefined

ex. 4 $f(x) = 9 - x^2$

max $x=0$ $f'(x) = -2x$

$-2x = 0$

$x = 0$



ex. 5 $f(x) = |x|$

min : $x=0$