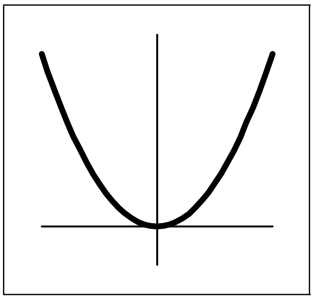
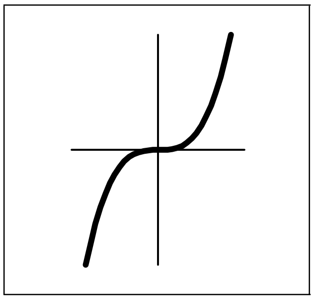
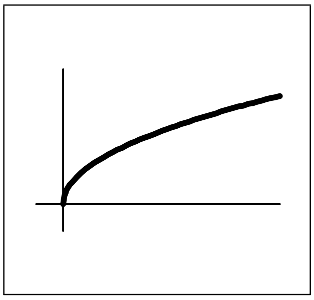
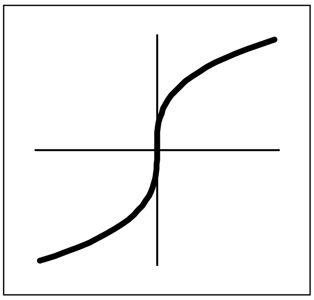
Argomento 3
Suggerimenti

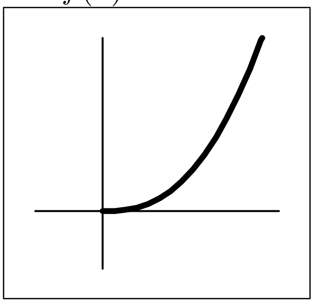
Suggerimento generale:
utilizzare i seguenti grafici per ricordare il comportamento delle funzioni elementari

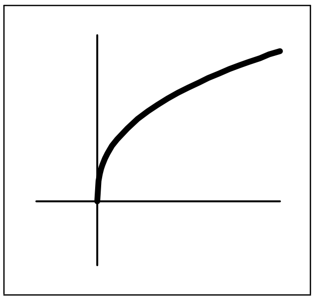

$f(x) = x^{2n}$

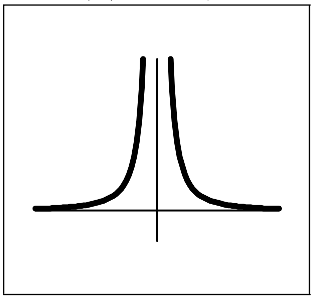

$f(x) = x^{2n+1}$

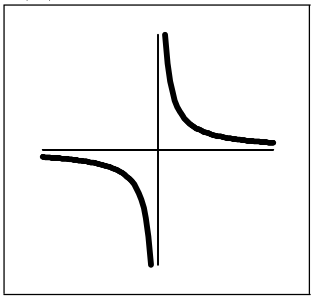

$f(x) = \sqrt[2n]{x}$

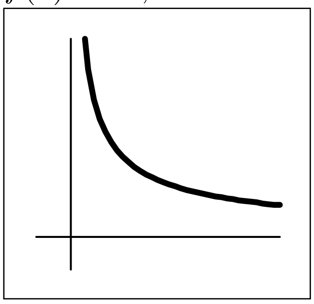

$f(x) = \sqrt[2n*1]{x}$

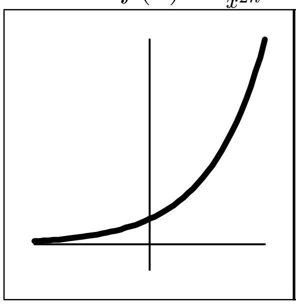

$f(x) = x^\alpha$, α reale > 1

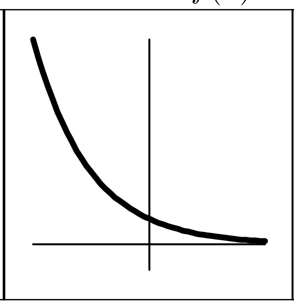

$f(x) = x^\alpha$, $0 < \alpha < 1$

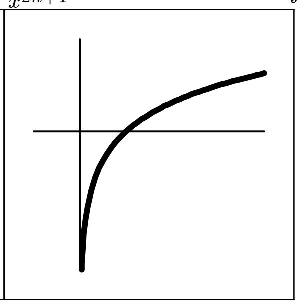

$f(x) = \frac{1}{x^{2n}} = x^{-2n}$

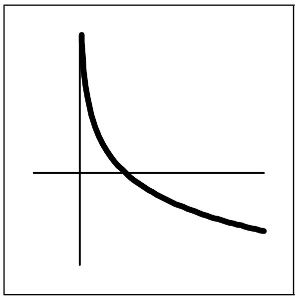

$f(x) = \frac{1}{x^{2n+1}} = x^{-2n-1}$

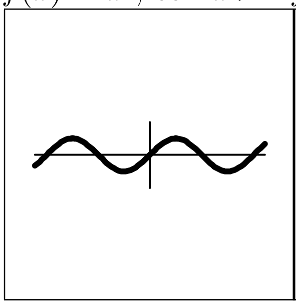

$f(x) = x^\alpha$, α reale < 0

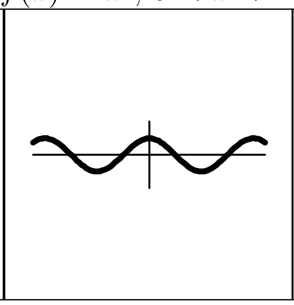

$f(x) = a^x$, con $a > 1$

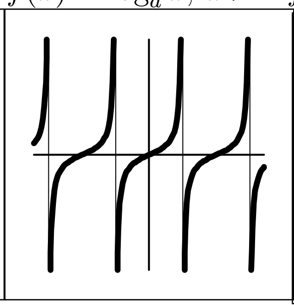

$f(x) = a^x$, $0 < a < 1$

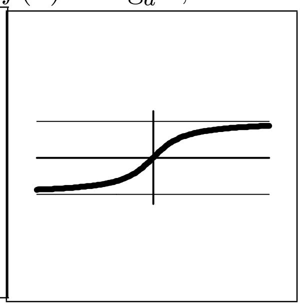

$f(x) = \log_a x$, $a > 1$


$f(x) = \log_a x, 0 < a < 1$


$f(x) = \sin x$


$f(x) = \cos x$


$f(x) = \tan x$


$f(x) = \arctan x$

Suggerimenti Ex. 3.1

17. Si noti che $\lim_{x\to1^+} x-1=0^+$ quindi $\lim_{x\to1^+} \frac{1}{x-1}=+\infty$.

19. Si noti che $\lim_{x\to+\infty} \log_2 x=+\infty$ e $\lim_{x\to+\infty} \log_{\frac{1}{2}} x=-\infty$ (oppure che $\log_{\frac{1}{2}} x=-\log_2 x$)

21. Si noti che $\lim_{x\to-\infty} 3x+2=-\infty$ e $\lim_{x\to-\infty} e^{2x}+4=4$.

24. Si noti che $\lim_{x\to+\infty} \log(e+e^{-x})=1$ e $\lim_{x\to+\infty} 1-\dfrac{1}{x}=1$.

26. Si noti che $\lim_{x\to+\infty} \left(\arctan x+\dfrac{1}{x}\right)=\dfrac{\pi}{2}+0$.

27. Si noti che $\lim_{x\to+\infty} 3^{\frac{1}{x}}=3^0=1$ e $\lim_{x\to+\infty} \sqrt{x^2-2}=+\infty$.

Suggerimenti Ex. 3.2

1. Si noti che $\lim_{x\to0^+} \dfrac{x^2+2x}{2x^5-5x^2}=\lim_{x\to0^+} \dfrac{x+2}{x(2x^3-5)}=....$

3. Si noti che $\lim_{x\to0} (\cos x)^2=1$ e $\lim_{x\to0} \left(\dfrac{1}{x^3}\right)^2=\lim_{x\to0} \dfrac{1}{x^6}=+\infty$.

4. Si noti che $\lim_{x\to2^+} x-2=0^+$ e $\lim_{x\to2^-} x-2=0^-$

6. Si noti che $\lim_{x\to0^-} \sqrt[3]{x^3+x}=0^-$

Suggerimenti Ex. 3.3

1. Si ricordi che $a^b=e^{b\log a}$ $(a>0)$. Si noti che $\lim_{x\to+\infty} (x^3-1)\log(x^2+1)=+\infty$

2. Si noti che $\lim_{x\to1} \log\left(\dfrac{x^2+2x}{2x^3-1}\right)=\log 3$ e $\lim_{x\to1} 2x^2=2$

3. Si noti che $\lim_{x\to+\infty} \log(\log x)=+\infty$ e $\lim_{x\to+\infty} \arctan(x)=\dfrac{\pi}{2}$

Suggerimenti Ex. 3.4

1. Si noti che valgono le disugualianze $\dfrac{1}{2x+1}\le\dfrac{1}{2x-\sin x}\le\dfrac{1}{2x-1}$ in un intorno $U(+\infty)$ di $+\infty$ in cui tutti i denominatori sono definiti e positivi, ad esempio in $\left(\dfrac{1}{2},+\infty\right)$.

Argomento 3

Soluzioni

Soluzioni Ex. 3.1

1. 4	**2**. 1	**3**. $+\infty$
4. 1	**5**. $+\infty$	**6**. $\frac{2}{3}$
7. 0	**8**. 0	**9**. $-\infty$
10. $-\infty$	**11**. $+\infty$	**12**. 3
13. $-\infty$	**14**. 0	**15**. 5
16. 0	**17**. $+\infty$	**18**. 0
19. $-\infty$	**20**. -2	**21**. $-\infty$
22. $-\infty$	**23**. 0	**24**. 1
25. 0	**26**. 1	**27**. 0

Soluzioni Ex. 3.2

1. non esiste	**2**. $+\infty$	**3**. $+\infty$
4. non esiste	**5**. $-\infty$	**6**. $-\infty$

Soluzioni Ex. 3.3

1. $+\infty$	**2**. 9	**3**. $+\infty$

Soluzioni Ex. 3.4

1. 0	**2**. 0	**3**. $+\infty$

Soluzioni Ex. 3.5

1.	4	**2**.	11	**3**.	$\frac{4}{\pi}$
4.	1	**5**.	non esiste	**6**.	$-\infty$
7.	$+\infty$	**8**.	$-\infty$	**9**.	0
10.	0	**11**.	-1	**12**.	$+\infty$
13.	$\frac{\sqrt{2}}{2}$	**14**.	1	**15**.	0