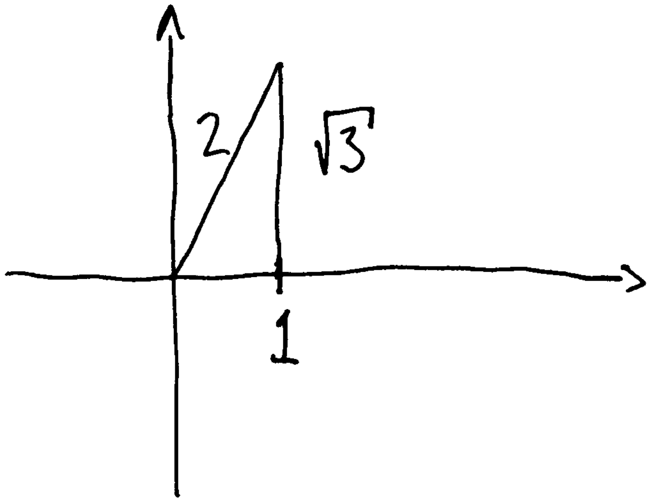
1. $\cot(x) = \dfrac{\cos(x)}{\sin(x)} = \dfrac{1}{\sqrt{3}}$



so $\cos(x) = \dfrac{ADJ}{HYP} = \dfrac{1}{2}$

$\csc(x) = \dfrac{HYP}{OPP} = \dfrac{2}{\sqrt{3}}$

$\Rightarrow$ A. $\dfrac{1}{2} + \dfrac{2}{\sqrt{3}}$

2. Line through center $(5,-3)$ and $(-1,-1)$

$$\text{slope} = m = \frac{-1-(-3)}{-1-5} = \frac{2}{-6} = -\frac{1}{3}$$

$$y = \frac{-1}{3}x + b$$

sub in $(-1,-1)$ $\rightarrow$ $-1 = \frac{1}{3} + b$

$$b = -4/3$$

c. $y = -1/3\, x - 4/3$

3. $f(x) = \sqrt{x^2+4}$ $\quad g(x) = 2^{x^2+1}$

$$(g \circ f)(x) = g(f(x))$$
$$= 2^{f(x)^2 + 1}$$
$$= 2^{x^2+4+1}$$

D. 2^{x^2+5}

4. Up by 3 $\rightsquigarrow$ $h(x) = f(x) + 3$

$$= e^x + x^2 + 3$$

Stretch by 3: $g(x) = h(x/3)$

$$= e^{x/3} + \frac{x^2}{9} + 3$$

C.

5. $|2x - 5| \le 6$

means $-6 \le 2x - 5 \le 6$

$2x - 5 \le 6 \implies x \le 11/2$

$2x - 5 \ge -6 \implies x \ge -1/2$

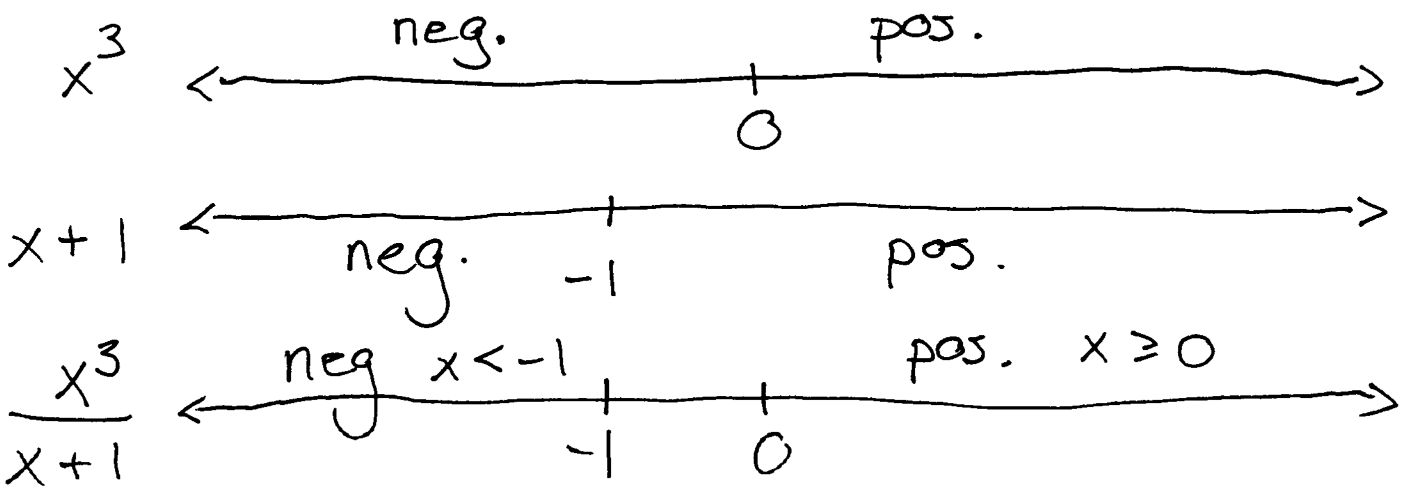
so $\frac{-1}{2} \le x \le 11/2$

B. $x \in [-1/2, 11/2]$

6. Domain of $\sqrt{\dfrac{x^3}{x+1}}$

Definitely $x \neq 1$

also need $\dfrac{x^3}{x+1} \geq 0$



so C. $(-\infty, -1) \cup [0, \infty)$

7. Domain of $f^{-1}(x)$ is range of e^{-x}; $x \geq 0$, so

B. $(0,1]$

8. $(*) = \lim\limits_{x \to -7^+} \dfrac{x^2 - 4x + 6}{(x+7)^3}$

$\lim\limits_{x \to -7^+} x^2 - 4x + 6 = 27 > 0$

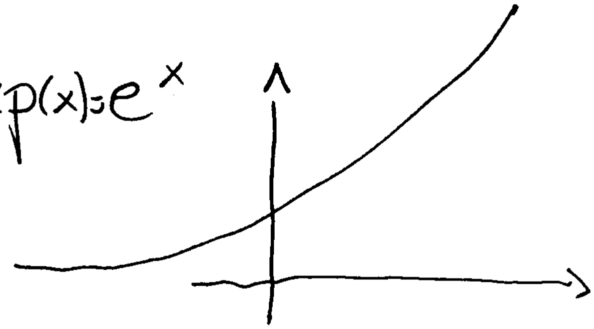
$\lim\limits_{x \to -7^+} (x+7)^3 = 0$, but if $x > -7$

$(x+7)^3 > 0$

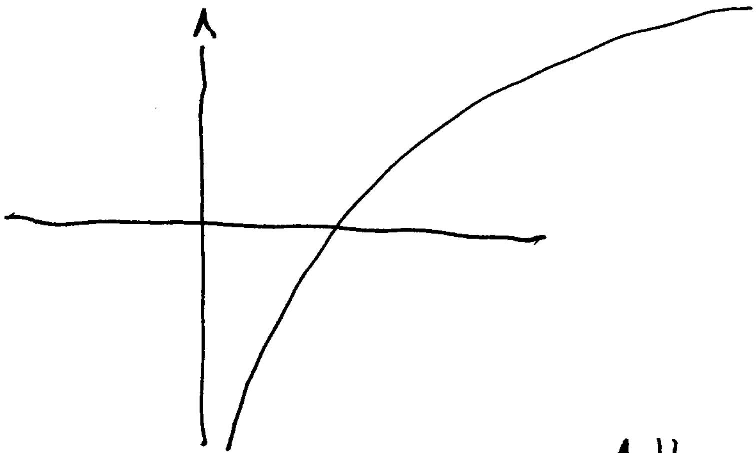
Thus "size" of $(*)$ is infinite and sign is positive

A. $+\infty$

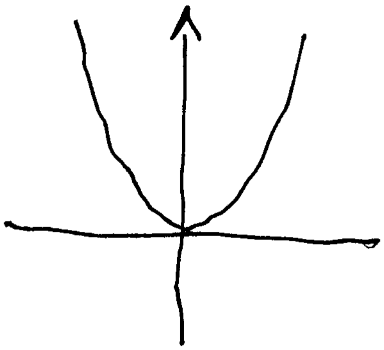
9. $\exp(x) = e^x$



$\ln(x)$



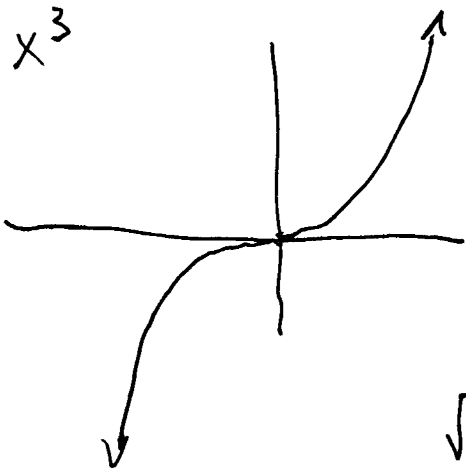
x^2



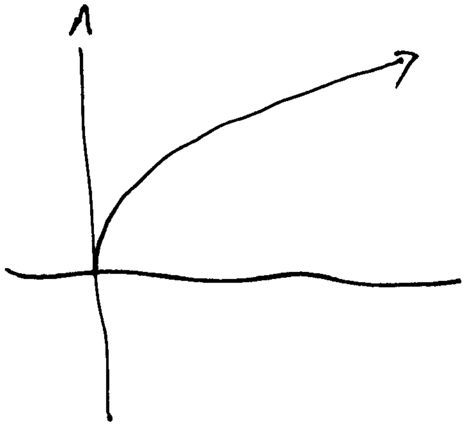
All but x^2 pass horizontal line test

c. Y, Y, N, Y, Y

x^3



$\sqrt{x}$



10. $f(x) = \dfrac{x - x^2}{x^3 - x} = \dfrac{x(1-x)}{x(x-1)(x+1)}$

$= \dfrac{-1}{x+1}$

$\lim_{x \to -1^+} \dfrac{-1}{x+1} = -\infty$,

so A. 1