

Practice problems review IV

**Exercise 1: sequences** a) For each of the following sequences, determine if it converges or not. If it does, what is its limit?

b) For each of the following sequences, determine if it is bounded or not. If it is bounded, find a bound.

(1)  $a_n = \arcsin\left(\frac{1}{n}\right), n \geq 1$

(2)  $b_n = \left(\frac{101}{100}\right)^n, n \geq 1$

(3)  $c_n = e^{\frac{n}{n+1}}, n \geq 1$

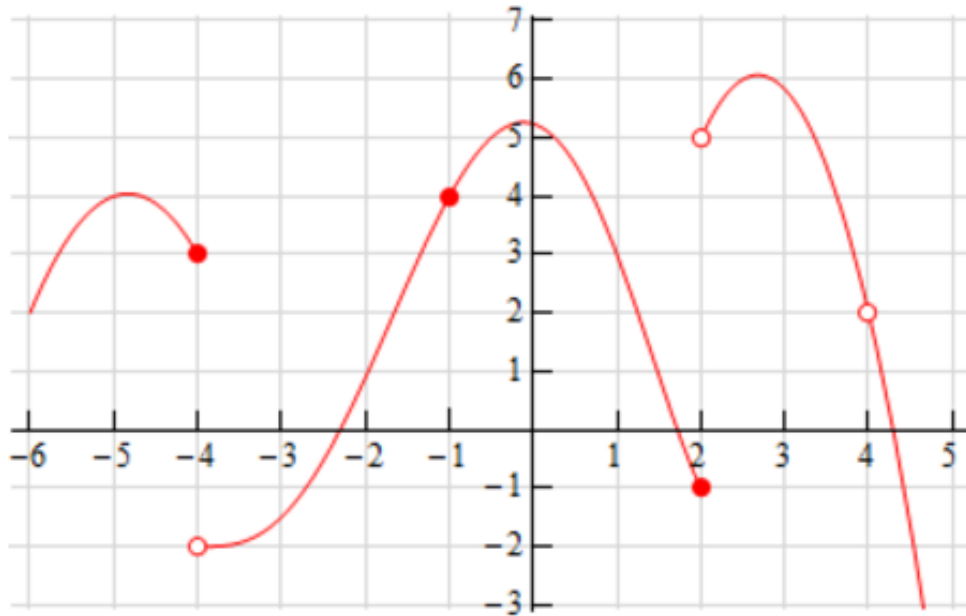
**Exercise 2: continuity and limits** For each of the following functions, determine

I. where it is discontinuous, and what types of discontinuities those are

II. the intervals on which the function is continuous

III.  $\lim_{x \rightarrow \infty} f\left(\frac{x^2 + x}{x^2 + 5}\right)$

(1) If  $f(x)$  is given by the following graph



(2) If  $f$  is defined by the following equations:

$$f(x) = \begin{cases} \sin(x) & \text{if } x < 0 \\ 5 & \text{if } x = 0 \\ \frac{x}{(x-2)(x-3)} & \text{if } x > 0 \end{cases}$$

**Exercise 3: trig and inverse trig.** Compute the following values as expressions without trig and inverse trig functions:

(1)  $\arctan(-\sqrt{3})$

(2)  $\arcsin(\sin(-\frac{3\pi}{4}))$

(3)  $\tan(\arccos(8/10))$

(4)  $\sin(\arctan(\frac{x+4}{x+3}))$