Solution Set 14

7.1/ 1. a) $\lim_{x\to\infty} (1.1)^x$ = undefined, because multiplying by 1.1 will add $\frac{1}{10}$ of the previous number to that number. Since we start with 1.1, we're always adding at least .1 for every x. Thus $(1.1)^x$ just keeps getting bigger.

b) $\lim_{x\to\infty} (.9)^x = 0$, because $.9^x = \frac{9^x}{10^x}$, and 10^x is always bigger than 9^x, and the difference only gets bigger as x increases, so the whole expression goes to 0.

c) $\lim_{x\to 0} (1.1)^x = 1$. Just evaluate it directly.

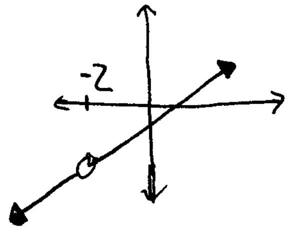
d) $\lim_{x\to-\infty} (1.1)^x = \lim_{x\to\infty} \frac{1}{(1.1)^x} = 0$. See 1a) to know $(1.1)^x$ just keeps getting bigger.

e) $\lim_{x\to-\infty} (.9)^x$ = undefined, Since $\lim_{x\to-\infty} (.9)^x = \lim_{x\to\infty} \frac{1}{(.9)^x}$ and we've already decided $(.9)^x$ goes to 0, so... there you have it.

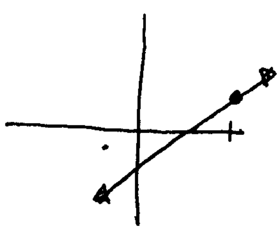
f) From the data we've collected, it looks like

$$\lim_{x\to\infty} b^x = \begin{cases} \text{undefined} & \text{for } b>1 \\ 1 & \text{for } b=1 \\ 0 & \text{for } b<1 \end{cases}$$

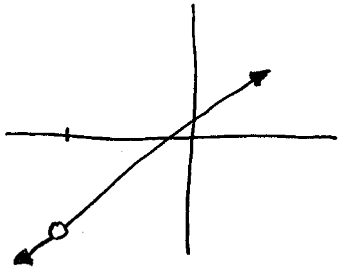
3 a) $\lim_{h\to-2} \frac{(h-3)(h+2)}{h+2} = -5$



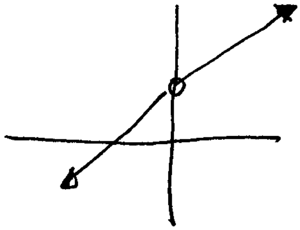
b) $\lim_{x\to 5} \frac{x^2-25}{x+5} = 0$



c) $\lim_{x \to -5} \frac{x^2-25}{x+5} = -10$



d) $\lim_{t \to 0} \frac{t^2+\pi t}{t} = \pi$



4. a) Random guess: e

b) 2.718281828459045...

20. a) $f(x) = x+1$

b) $(x) = x^2-1$

7.2 10. a) $\lim_{x \to -\infty} f(x) = 0$

b) since $\lim_{x \to 7^+} f(x) \neq \lim_{x \to 7^-} f(x)$, the limit doesn't exist.

c) -1

d) doesn't exist

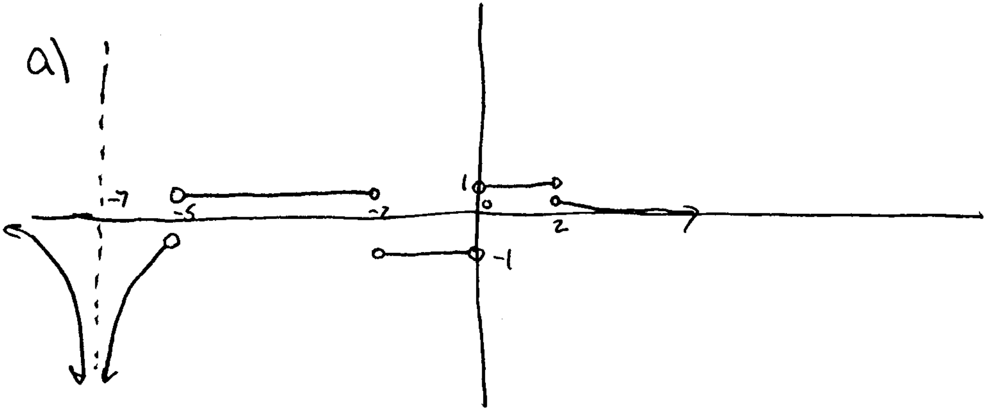
e) 2

f) 2

g) 1

h) 0

11) a)



b) f' is undefined at $-7, -5, -2, 0,$ and 2

c) i) 0

ii) 1

iii) -1

iv) doesn't exist

v) $-\infty$

vi) $-\infty$

14. False: Take $f(x) = \dfrac{(x)(x-2)}{x-2}$. In this case $f(2)$ is undefined, but $\lim_{x \to 2} f(x) = 2$.