Math 131 - Homework 1

February 3, 2021

Name __key__

Score _____

The following problems are from the suggested homework. Show all work to receive full credit. Supply explanations when necessary. This assignment is due on February 10.

1. (2 points) Let $f(x) = (1+x)^{1/x}$. Make a table showing the values of f at $x = \pm 0.001$, $x = \pm 0.0001$, and $x = \pm 0.00001$. Use your table to estimate $\lim\limits_{x \to 0} f(x)$.

X	$f(x) = (1+x)^{1/x}$
0.001	2.716924
-0.001	2.719642
0.0001	2.718146
-0.0001	2.718418
0.00001	2.718268
-0.00001	2.718295

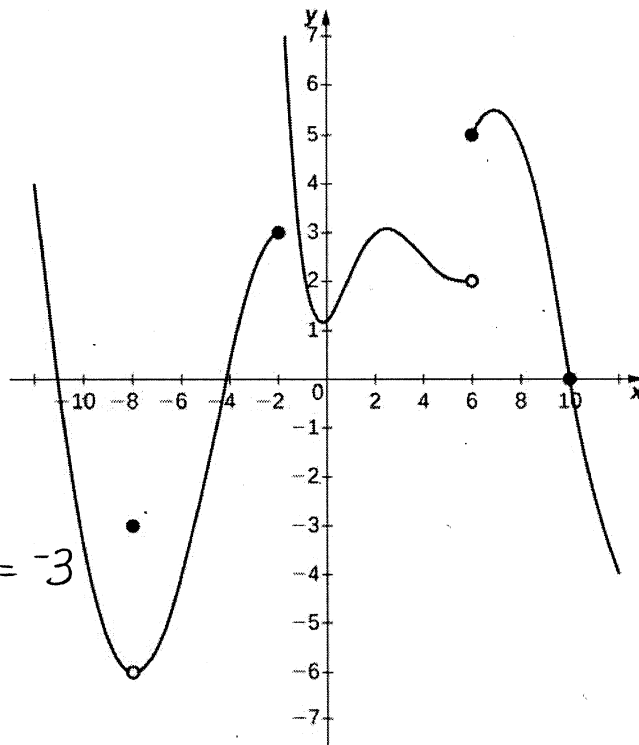$\lim\limits_{x \to 0} f(x) \approx 2.7183$

(THE ACTUAL LIMIT IS e.)

2. (2 points) In the online version of the textbook, do problems 46–49 in section 2.2.

T 46.) $\lim\limits_{x \to 10} f(x) = 0$

F 47.) $\lim\limits_{x \to -2^+} f(x) = +\infty$

F 48.) $\lim\limits_{x \to -8} f(x) = -6$
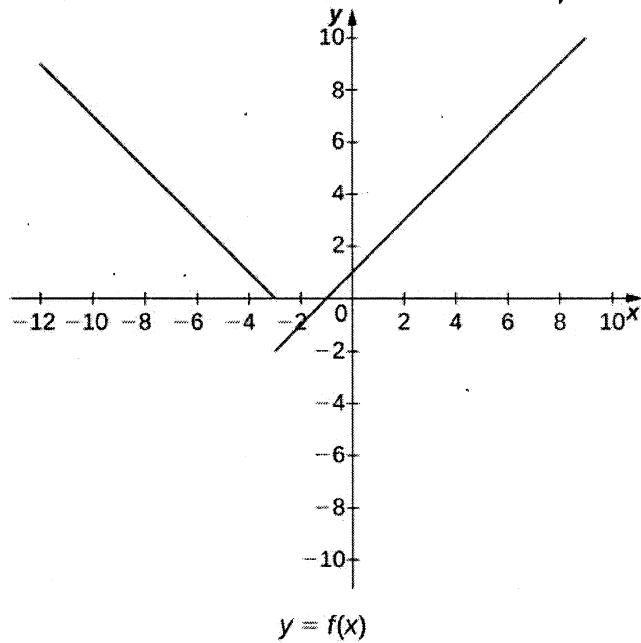
$\neq f(-8) = -3$

F 49.) $\lim\limits_{x \to 6} f(x)$ DNE

3. (2 points) Evaluate the limit: $\displaystyle\lim_{x\to-3}\frac{\sqrt{x+4}-1}{x+3}\cdot\frac{\sqrt{x+4}+1}{\sqrt{x+4}+1}$

$$\lim_{x\to-3}\frac{x+4-1}{(x+3)\left[\sqrt{x+4}+1\right]} = \lim_{x\to-3}\frac{1}{\sqrt{x+4}+1} = \boxed{\frac{1}{2}}$$

4. (2 points) In the online version of the textbook, do problems 119 and 121 in section 2.3.

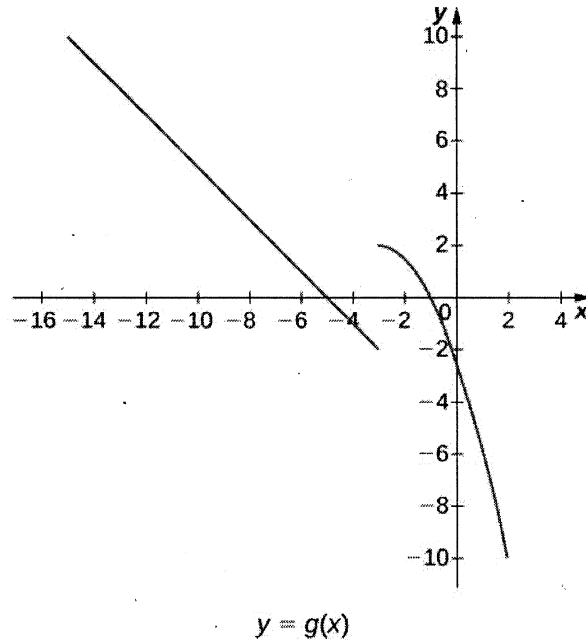$y = f(x)$

119.)

$$\lim_{x\to-3^-}\left(f(x)-3g(x)\right)$$
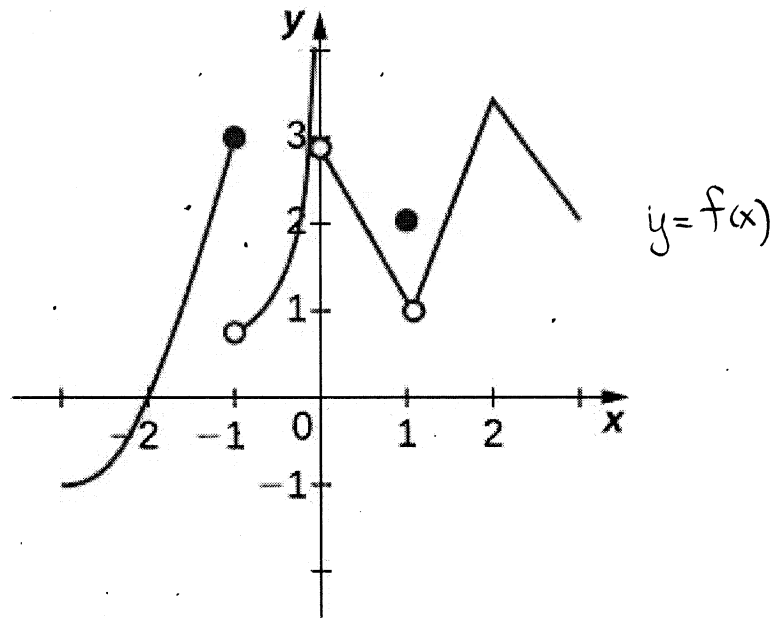
$$= 0-3(-2)$$

$$= \boxed{6}$$

121.)

$$\lim_{x\to-5}\frac{2+g(x)}{f(x)}$$

$$= \frac{2+0}{2} = \boxed{1}$$

$y = g(x)$

5. (2 points) In the online version of the textbook, do problem 154 in section 2.4.

154.)

(a) f IS DISCONTINUOUS AT $x = -1$, $x = 0$, $x = 1$

(b) $x = -1$ ... $\lim\limits_{x \to -1} f(x)$ DNE

  $x = 0$ ... $\lim\limits_{x \to 0} f(x)$ DNE AND $f(0)$ DNE

  $x = 1$ ... $\lim\limits_{x \to 1} f(x) = 1 \neq f(1) = 2$

(c) $x = -1$ ... JUMP DISCONT

  $x = 0$ ... INFINITE DISCONT

  $x = 1$ ... REMOVABLE DISCONT