MTH 380 TEST 1 July 25, 1995 Solutions

(1-2) Perform the indicated operations and simplify. Write your answer with no negative exponents.

$$2-3\{x+2[x-(x+5)]+1\}$$

$$2-3\{x+2[x-x-5]+1\}$$

$$2-3\{x+2[-5]+1\}$$

(5 pts.) 1.) $2-3\{x-10+1\}$

$$2-3(x-9)$$

$$2-3x+27$$

$$29-3x$$

(5 pts.) 2.) $$\left(\frac{-2x^{-3}y}{x^2y^3}\right)^{-2}=\left(\frac{-2}{x^5y^2}\right)^{-2}=\left(\frac{x^5y^2}{-2}\right)^{2}=\frac{x^{10}y^4}{4}$$

(3 pts.) 3.) Solve for x and graph your solution: $-2x+5<11$

$-2x<6$ $x>-3$

(5 pts.) 4.) Find all the real solutions of the following using any method you wish:

$$8x^2+2x=15$$

$$8x^2+2x-15=0$$

$$(2x+3)(4x-5)=0$$

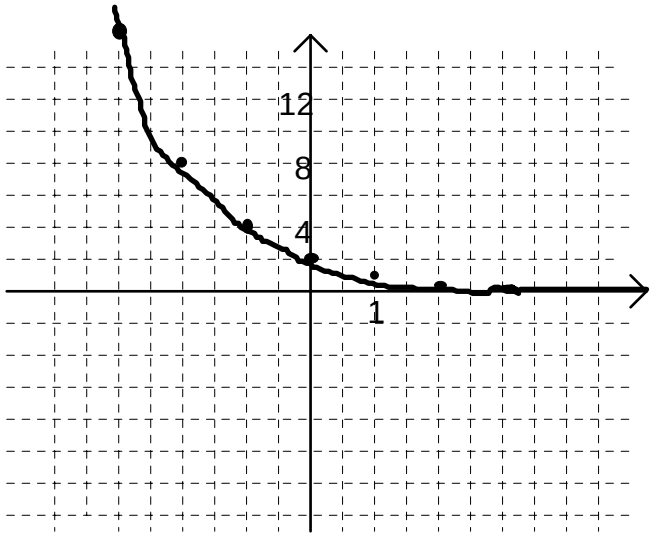
$$x=-3/2\ ,\ 5/4$$

(7 pts.) 5.) If $g(x)=3x^2+2$ find and simplify: $\dfrac{g(2+h)-g(2)}{h}$

$$g(2+h)=3(2+h)^2+2=3(4+4h+h^2)+2=14+12h+3h^2 \quad \textit{so}$$

$$\frac{g(2+h)-g(2)}{h}=\frac{14+12h+3h^2-14}{h}=\frac{12h+3h^2}{h}=12+3h$$

(8 pts.) 6.) Graph $f(x)=2\left(\frac{1}{2}\right)^x$ Label at least one tick mark on each axis so that your scale is obvious.



x	f(x)
-3	16
-2	8
-1	4
0	2
1	1
2	1/2
3	1/4

(4 pts.) 7.) Solve for x: $7^{x^2} = 7^{2x+3}$

$x^2 = 2x + 3$ $x^2 - 2x - 3 = 0$ $(x-3)(x+1) = 0$ $x=3$ or -1

(4 pts.) 8.) Simplify: $\left(e^{x} - e^{-x}\right)^2 = e^{2x} - 2e^{x}e^{-x} + e^{-2x} = e^{2x} - 2 + 1/e^{2x}$

(4 pts.) 9.) Solve for x:

$$\log_b x = \tfrac{1}{4}\log_b 16 - \tfrac{1}{2}\log_b 9$$

$$\log_b x = \log_b 16^{1/4} - \log_b 9^{1/2}$$

$$\log_b x = \log_b 2 - \log_b 3 = \log_b \frac{2}{3}$$

$$x = \frac{2}{3}$$

(3 pts.) 10.) Find x to six decimal places: $\log x = -3.0672$

$x = 10^{-3.0672} = 0.000857$

(2 pts.) 11.) Use your calculator to find $\log_5 30$. Round off at the 3rd decimal place.

$$\log_5 30 = \frac{\log 30}{\log 5} = 2.113$$

(22 pts.) 12.) Use the graph in the picture to evaluate the following (Use ∞ or $-\infty$ where appropriate. Use d.n.e. for does not exist.) (2 pts. each)

(a.) $f(0) = 1.5$ (b.) $f(1) = 2$ (c.) $f(2) = 3$ (d.) $f(3) = 1.75$

(e.) $\lim_{x\to 1} f(x) = 1$ (f.) $\lim_{x\to 2^-} f(x) = -\infty$

(g.) $\lim_{x\to 2^+} f(x) = 3$ (h.) $\lim_{x\to 0} f(x) = 1.5$

(i.) $\lim_{x\to \infty} f(x) = 1.5$ (j.) $\lim_{x\to 2} f(x) =$ d.n.e.

(k.) For which values of x is $f(x)$ discontinuous? at x=1, 2

(20 pts.) 13.) Evaluate the following limits: (Use ∞ or $-\infty$ where appropriate. Use d.n.e. for does not exist.) (4 pts. each)

(a.) $\lim_{x\to\infty}\dfrac{3x^2+2x-5}{x^2}=\lim_{x\to\infty}\left(3+\dfrac{2}{x}-\dfrac{5}{x^2}\right)=3$

(b.) $\lim_{x\to-3}\left(x^2+3x+2\right)=9-9+2=2$

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

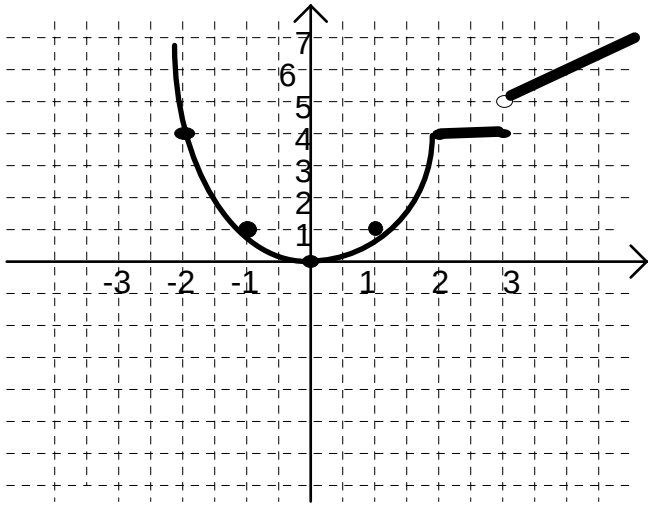
(d.) $\lim_{x\to2}\sqrt{x+14}=4$

x	$\frac{x+2}{x-4}$
5	7
4.1	61
4.01	601
4.001	6001
4.0001	60,001

(e.) $\lim_{x\to4^+}\dfrac{x+2}{x-4}=\infty$

(8 pts.) 14.) Draw a rough graph and name all x-values where $f(x)$ is discontinuous. (8 pts.)

$$f(x)=\begin{cases}x^2 \text{ when } x<2\\ 4 \text{ when } 2\le x\le 3\\ x+2 \text{ when } x>3\end{cases}$$



f is discontinuous

at x = 3 .