MATH 1000, Section 6, Slot F05
Worksheet #1

Due: Tuesday Sept 15/2009, by 5pm

SOLUTIONS

Name:

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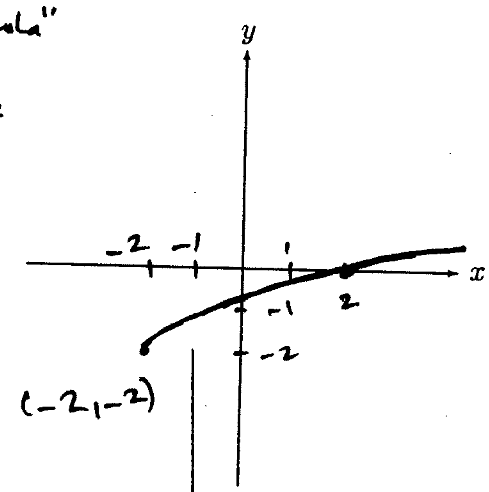
1. Sketch the graph of each function. Try it by hand; that is, without a calculator. Indicate any "special" points on the graph.

(a) $f(x) = \sqrt{x+2} - 2$

"Half-Parabola"

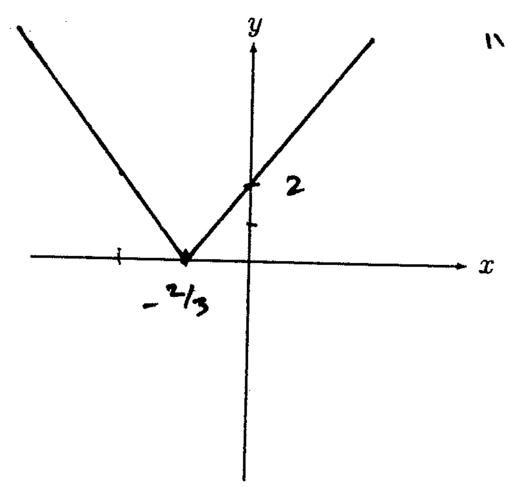
x	y
-2	-2
0	$\sqrt{2}-2$
2	0

vertex



(b) $g(x) = \sqrt{(3x+2)^2}$ = $|3x+2|$

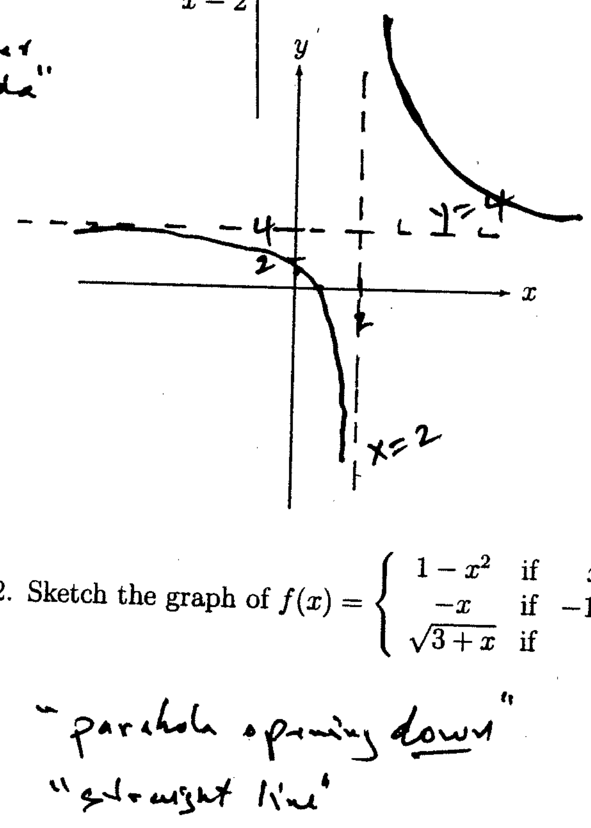
"V-shaped"



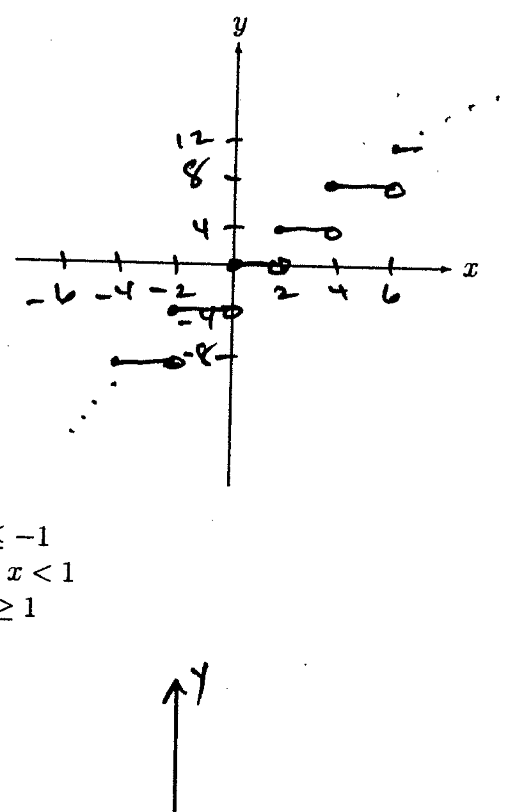
(c) $y = \dfrac{4x-3}{x-2}$

"Rectangular Hyperbola"

x	y
0	3/2
$\frac{3}{4}$	0
3	9



(d) $f(x) = 4[\![x/2]\!]$

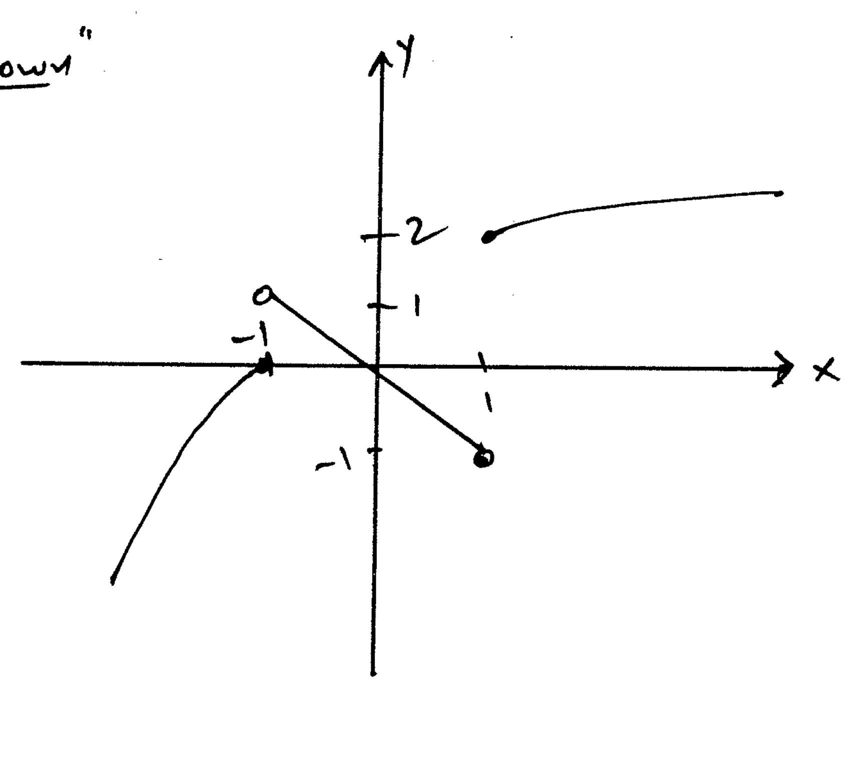


2. Sketch the graph of $f(x) = \begin{cases} 1-x^2 & \text{if} \quad x \le -1 \\ -x & \text{if} \quad -1 < x < 1 \\ \sqrt{3+x} & \text{if} \quad x \ge 1 \end{cases}$

$y = 1-x^2$ "parabola opening down"

$y = -x$ "straight line"

$y = \sqrt{3+x}$ "half-parabola"



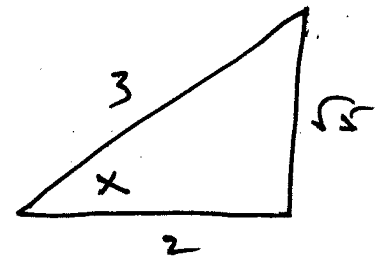
3. If $\cos x = 2/3$ and $-\pi/2 < x < 0$, find $\sin x$. Then determine

(a) $\sin(2x)$,

(b) $\cos(2x)$,

(c) the quadrant that $2x$ is in.

Justify all answers.



X IS IN QUADRANT IV.

BY "CAST" RULE, $\sin x = -\frac{\sqrt{5}}{3}$.

(a) $\sin(2x) = 2\sin x \cos x = 2\left(-\frac{\sqrt{5}}{3}\right)\left(\frac{2}{3}\right) = -\frac{4\sqrt{5}}{9}$

(b) $\cos(2x) = \cos^2 x - \sin^2 x = \frac{4}{9} - \frac{5}{9} = -\frac{1}{9}$.

(c) SINCE $\sin 2x < 0$ AND $\cos 2x < 0$,

$2x$ IS IN QUADRANT III BY "CAST" RULE

4. Using your calculator, make up a small table of values which will suggest the value of $\lim_{x\to 1} \frac{\sqrt[3]{x}-1}{\sqrt{x}-1}$. Write the apparent limit as a rational number.

X	Y
1.04	.66449
1.03	.66502
1.02	.66557
1.01	.66611

$$\lim_{x\to 1} \frac{\sqrt[3]{x}-1}{\sqrt{x}-1} = \frac{2}{3}.$$

5. Using your calculator, make up a small table of values which will suggest the value of $\lim_{x\to 1} \frac{\sin(x^2-1)}{\ln(x^2)}$. Write the apparent limit as a rational number.

X	Y
1.04	1.0391
1.03	1.0295
1.02	1.0198
1.01	1.0099

$$\lim_{x\to 1} \frac{\sin(x^2-1)}{\ln(x^2)} = 1.$$