Math 220 Section 4 Supplementary Exercises

1. Find the Natural Domain for each function:

$f(x)=\sqrt{2x-7}$ $\qquad f(x)=\sqrt{5-x}$ $\qquad f(x)=\dfrac{x^2+x-2}{x^2+7x+10}$ $\qquad f(x)=\dfrac{x^5-x+5}{3}$

$f(x)=\dfrac{x^2+2}{2x+1}$ $\qquad f(x)=\dfrac{x^2+3x}{x}$ $\qquad f(x)=\sqrt[3]{\dfrac{x-2}{x+6}}$ $\qquad f(x)=\sqrt{\dfrac{x}{x+1}}$

2. For each piece-wise defined function below,
   (a) State the domain of the function
   (b) Evaluate the function at x values: $-3,\ -1,\ 0,\ \frac{1}{2},\ 2$ if these values are in the domain.
   (c) Sketch a graph of the function. Be sure to scale your axes.

$$f(x)=\begin{cases} x+2 & x<-1 \\ 2 & x\geq 0 \end{cases} \qquad g(x)=\begin{cases} x^2 & x<0 \\ -x^2 & x\geq 0 \end{cases} \qquad h(x)=\begin{cases} 2 & x\leq -3 \\ -x+1 & -3<x<0 \\ \sqrt{x} & 0\leq x\leq 4 \end{cases}$$

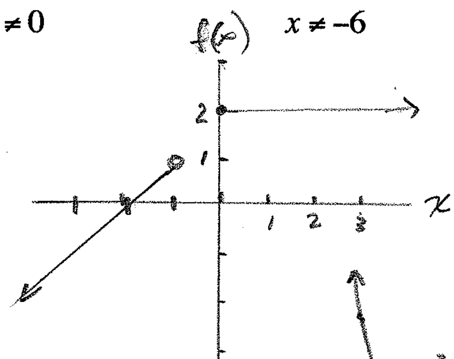
3. Sketch the graph of $f(x)=\dfrac{x^2+3x}{x}$

Answers:

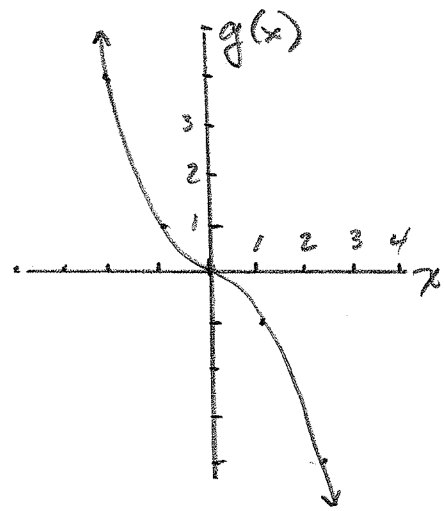
1. $\left[\frac{7}{2},\ \infty\right)$ $\qquad (-\infty,\ 5]$ $\qquad x\neq -2$ *and* $x\neq -5$ $\qquad \Re$

$x\neq -\frac{1}{2}$ $\qquad x\neq 0$ $\qquad x\neq -6$ $\qquad (-\infty,\ -1)\cup[0,\ \infty)$

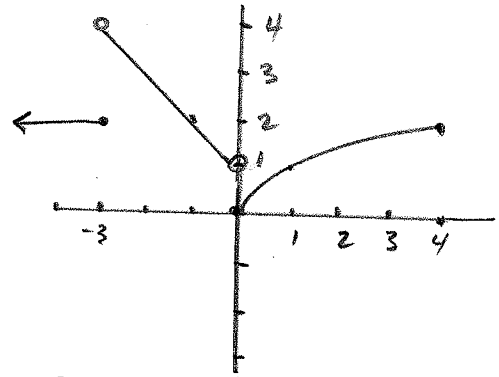
2. $D_f:\ (-\infty,\ -1)\cup[0,\ \infty)$
   $f(-3)=-1$
   $f(-1)$ is undefined
   $f(0)=2$
   $f\left(\frac{1}{2}\right)=2$
   $f(2)=2$



   $D_g:\ \Re$
   $g(-3)=9$
   $g(-1)=1$
   $g(0)=0$
   $g\left(\frac{1}{2}\right)=-\frac{1}{4}$
   $g(2)=-4$



D_h: $(-\infty,\ 4]$
$h(-3) = 2$
$h(-1) = 2$
$h(0) = 0$
$h\left(\frac{1}{2}\right) = \frac{1}{\sqrt{2}}$
$h(2) = \sqrt{2}$



3. Note that $D_f : x \neq 0$ and that $f(x) = \dfrac{x^2 + 3x}{x} = x + 3$ *if* $x \neq 0$ So, the graph for f is exactly like the graph for $y = x + 3$ except that there is no value when $x = 0$. $y = x + 3$ is a line.