Asst 6
3.3 #2, 10
3. #1, 5,

3.3/2. Decompose $h(x)$ into $f(g(x))$

Strategy: look for operations which are repeated or act on more complicated expressions

a) $h(x) = \sqrt{x^2+3}$, try $g(x) = x^2+3$, $f(x) = \sqrt{x}$

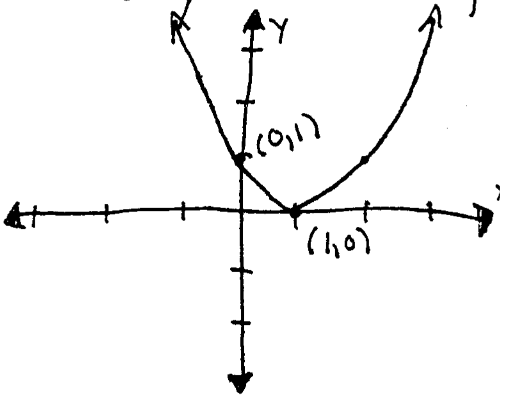
b) $h(x) = \sqrt{x} + 5/\sqrt{x}$, try $g(x) = \sqrt{x}$, $f(x) = x + 5/x$

c) $h(x) = 3/(3x^2+2x)$, choose $g(x) = 3x^2+2x$, $f(x)$ $3/x$

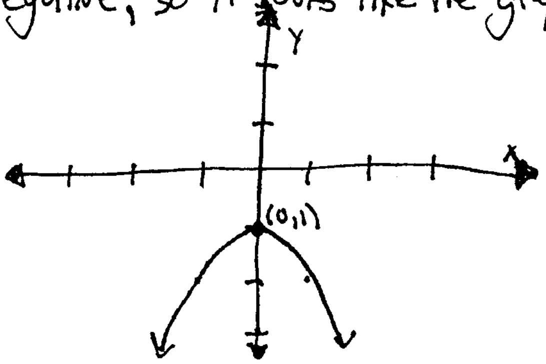
d) $h(x) = 5(x^2+3x^3)^3$, choose $g(x) = x^2+3x^3$, $f(x)$ $5x^3$

0 Graph by starting with a familiar function

a) $y = (x-1)^2 \rightarrow$ should look like y ^{2} only instead of $y=0$ when $x=0$, we have $y=0$ when $x=1$



b) $y = -x^{-} - 1 \rightarrow$ should again look like $y = x^2$, but x 0 gives us $y=-1$, and as $|x|$ gets bigger, y gets more negative, so it looks like the graph is flipped.



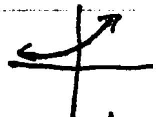
3.4/ 1. Zeros of $f(x)$ are $x=-4,-1,2,$ and 8. Find zeros of:

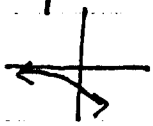
a) $m(x)=5\cdot f(x)$. $5\cdot f(x)=0$ when $f(x)=0$, so $x=-4,-1,2,8$

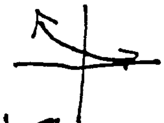
b) $g(x)=f(x+2)$ $f(x+2)=0$ when $x+2=-4,-1,2,$ or 8 so $x=-6,-3,0,6$

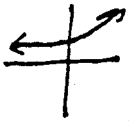
c) $h(x)=f(2x)$ $f(2x)=0$ when $2x=-4,-1,2,$ or 8 so $x=-2,-\frac{1}{2},1,4$

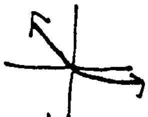
d) $j(x)=f(x-1)$ $f(x-1)=0$ when $x-1=-4,-1,2,$ or 8 so $x=-3,0,3,9$

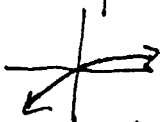
5. $y=2^x$ looks like: 

a) $y=-2^x$ looks like  (flipped), answer is: $\boxed{vi}$

b) $y=2^{-x}$ makes positive x look like negative x:  : answer is: $\boxed{ii}$

c) $y=2^x+1$ moves y up 1 for a given x:  : answer is $\boxed{vii}$

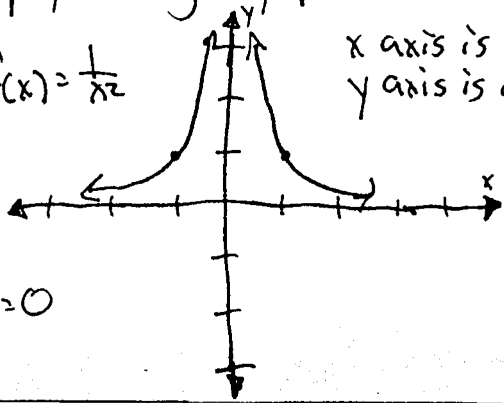
d) $y=2^{-x}-1$ is like b), only moved down:  : answer is: $\boxed{vii}$

e) $y=-2^{-x}+1$ flips x & y, then moves up 1:  : answer is: $\boxed{iii}$

f) $y=-2^x+1$ flips across y axis, then up 1:  : answer is: $\boxed{i}$

7. Graph, labeling asymptotes & intercepts,

a) $f(x)=\frac{1}{x^2}$

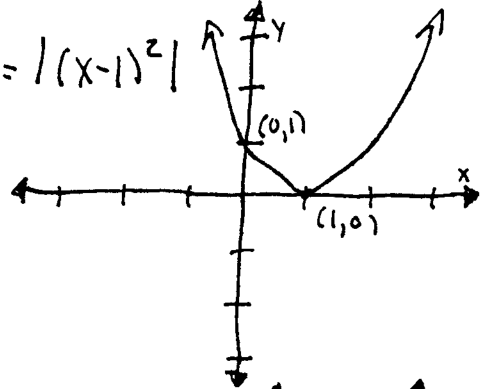


x axis is an asymptote.
y axis is an asymptote.

Note how $f(x)$ goes off to infin
when x goes to 0 (from either direction
and $f(x)\to 0$ as $|x|$ gets bigger,
Left side is flipped compared to $f(x)=$
because x^2 is always positive.

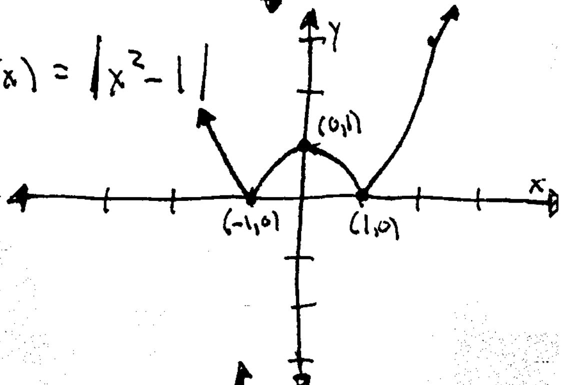
Asymptotes: $x=0, y=0$

7. b) $g(x) = |(x-1)^2|$



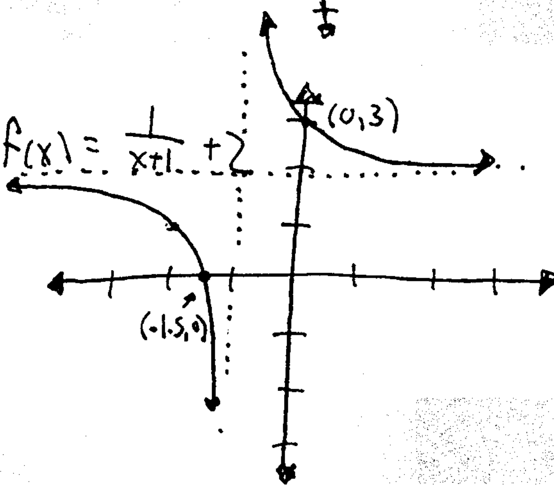
Note that since $(x-1)^2$ is always positive anyway, the absolute value does nothing.

c) $h(x) = |x^2-1|$



Try a few points: $x = 0$, $x = 1$, x $x = 2, -2$. Then we see that x $h(x) \geq 0$, the graph is just x^2 (because the absolute value does nothing to positive #'s), and for $h(x) < 0$, it's flipped ove (again, because of the absolute valu

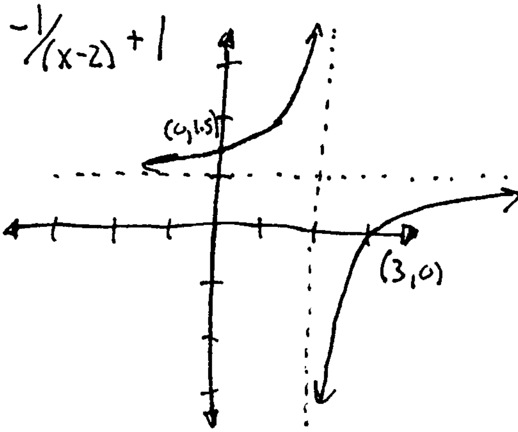
d) $f(x) = \frac{1}{x+1} + 2$



Looks like $f(x) = \frac{1}{x}$, but it's shifted left 1 and up 2. To find intercepts, plug in $x = 0$ an $y = 0$.

Asymptotes: $x = -1$, $y = 2$

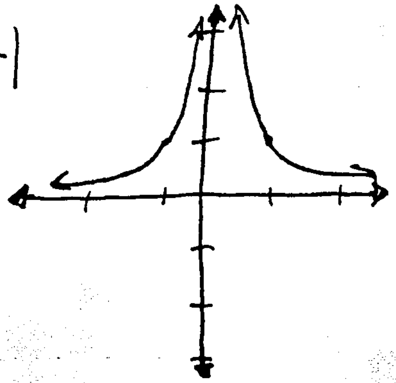
e) $m(x) = -1/(x-2) + 1$



Looks like $f(x) = \frac{1}{x}$, shifted u 1, right 2. Also the (-) flip the graph.

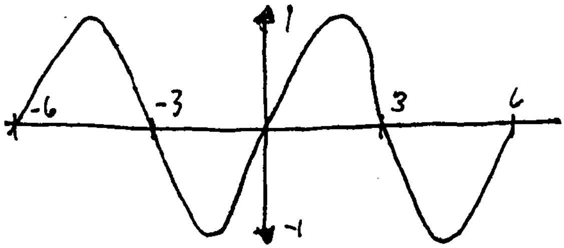
Asymptotes: $x = 2$, $y = 1$

7. f) $p(x) = \left|\frac{1}{x}\right|$



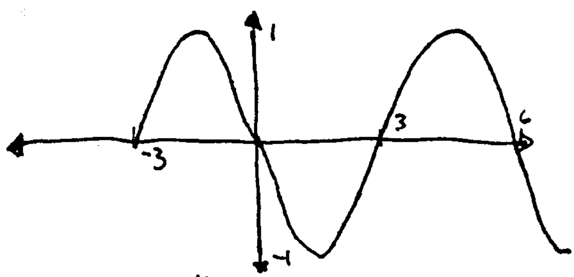
Looks just like $\frac{1}{x}$, only the negative side flips.
Asymptotes: $x=0$, $y=0$

11.



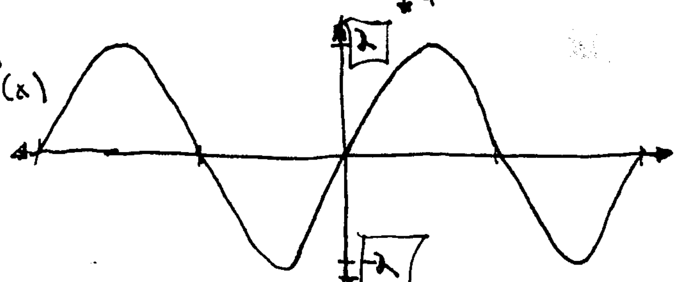
This is $f(x)$

a) $y = f(x-3)$



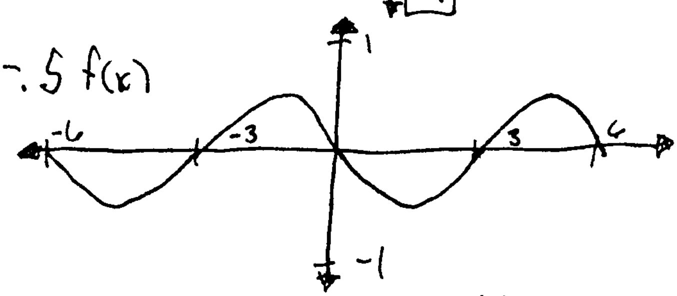
shifts right 3

b) $y = 2f(x)$



stretches vertically

c) $y = -.5 f(x)$



shrinks & flips

d) $y = f(x/2)$