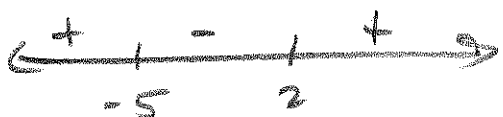


① ②  $f(x) = \frac{x^2+5}{x^2+3x-10} \Rightarrow D(f) = \{x \mid x^2+3x-10 \neq 0\}$

Scratch:  $(x+5)(x-2) = 0$   
 $x = -5, 2$   
 $= \{x \mid x \neq -5 \text{ and } x \neq 2\}$   
 $= (-\infty, -5) \cup (-5, 2) \cup (2, \infty)$

③  $f(x) = \sqrt{x^2+3x-10} \Rightarrow D(f) = \{x \mid x^2+3x-10 \geq 0\}$

Scratch:  $= \{x \mid x \leq -5 \text{ OR } x \geq 2\}$



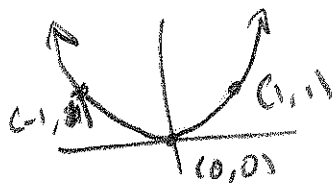
$= (-\infty, -5] \cup [2, \infty)$

④  $f(x) = \ln(x^2+3x-10) \Rightarrow D(f) = \{x \mid x^2+3x-10 > 0\}$

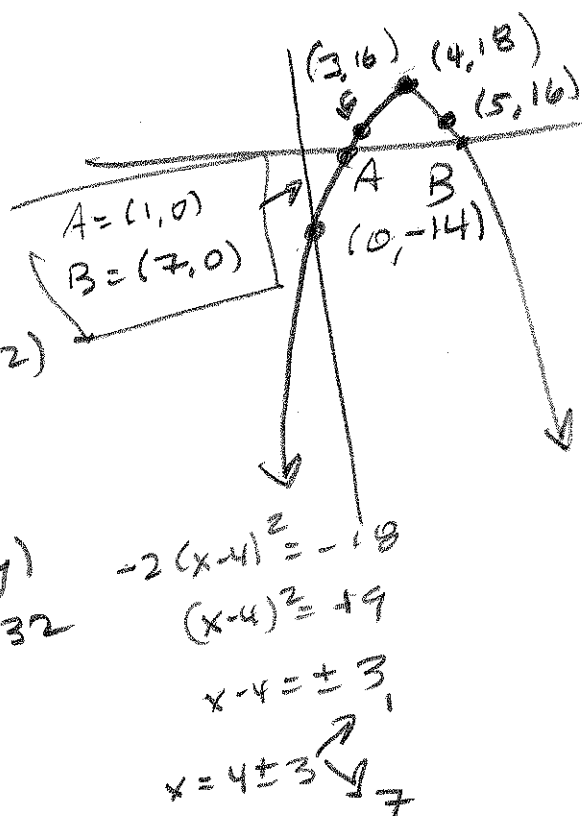
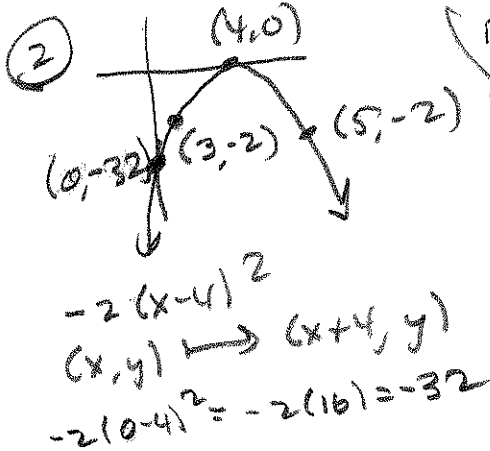
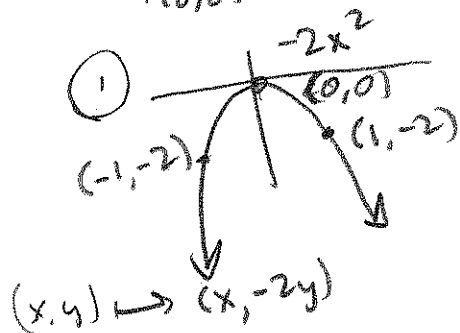
Same sign pattern  
 strict inequality  
 $= \{x \mid x < -5 \text{ OR } x > 2\}$   
 $= (-\infty, -5) \cup (2, \infty)$

⑤ Graph  $g(x) = -2(x-4)^2 + 18$

$f(x) = x^2$



- ①  $-2f(x) = -2x^2$
- ②  $-2f(x-4) = -2(x-4)^2$
- ③  $-2f(x-4) + 18 = g(x)$



3) a)  $f(x) = x^2 - 2x - 8 \stackrel{\text{SET}}{=} 0$

$\Rightarrow (x-4)(x+2) = 0$

$\Rightarrow x \in \{-2, 4\}$

b)  $a=1, b=-2, c=-8$

$b^2 - 4ac = (-2)^2 - 4(1)(-8)$

$= 4 + 32 = 36$

$x = \frac{2 \pm \sqrt{36}}{2(1)} = \frac{2 \pm 6}{2}$

$x \in \{-2, 4\}$

c)  $x^2 - 2x = 8$

$x^2 - 2x + 1^2 = 8 + 1^2$

$(x-1)^2 = 9$

$x-1 = \pm 3$

$x = 1 \pm 3 \rightarrow 4, -2$

$x \in \{-2, 4\}$

4)  $(x+2)^2(x-3)(x-1)^3 \geq 0$



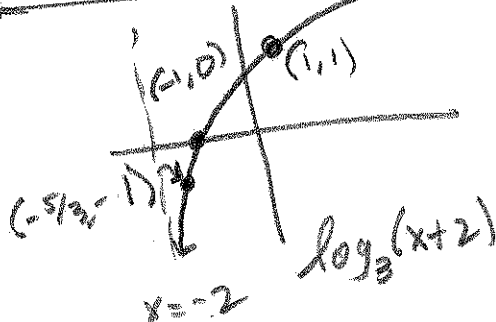
$x \in (-\infty, -2] \cup [1, \infty)$

5)  $-4, m=1; 2, m=3; 3+2i, m=1$

$(x+4)(x-2)^3(x-(3+2i))(x-(3-2i))$

6)  $f(x) = x^4 - 11x^3 + 42x^2 - 14x - 68$

3	1	-11	42	-14	-68
		3	-24	54	120
	1	-8	18	40	52 = f(3)



$A: \log_3(2) - 3$

$\approx (-2.369070246)$

$A = (0, \log_3(2) - 3)$

$B = (25, 0)$

$\log_3(x+2) - 3$

$x = -2$



$(1, -2)$

$(-1, -3)$

$(-5/3, -4)$

$B: \log_3(x+2) = 3$

$x+2 = 3^3 = 27$

$x = 25$

8)  $A(t) = A_0 e^{-kt}$

Given  $A_0 e^{-4700k} = \frac{1}{2} A_0$

$e^{-4700k} = \frac{1}{2}$

$-4700k = \ln\left(\frac{1}{2}\right) = -\ln 2$

$k = \frac{\ln 2}{4700}$   
EXACT

$\approx .0001474781235$  APPROX  
 $\approx 1.4748 \times 10^{-4}$

$A(t) \approx A_0 e^{-.000147t}$   
MODEL

$\approx .000147$  APPROX

9) a)  $\sum_{k=1}^{20} 3 \cdot 2^{k+1}$   $a=3$   
 $r=2$   
 $n=20$

$S_n = \frac{3(1-2^{20})}{1-2} = 3,145,725$

b)  $\sum_{k=1}^{\infty} 3\left(\frac{2}{3}\right)^{k-1}$   $a=3$   
 $r=\frac{2}{3}$   
 $n \rightarrow \infty$

$\frac{a}{1-r} = \frac{3}{1-\frac{2}{3}} = \frac{3}{\frac{1}{3}} = 9$

10)  $x + y = 7$   
 $3x - 2y = 8$   
 $y = 7 - x$   
 $3x - 2(7 - x) = 8$   
 $3x - 14 + 2x = 8$

11)  $\left[ \begin{array}{cc|c} 1 & 1 & 7 \\ 3 & -2 & 8 \end{array} \right]$   $R_1$   
 $-3R_1 + R_2 \rightarrow \left[ \begin{array}{cc|c} 1 & 1 & 7 \\ 0 & -5 & -13 \end{array} \right]$

$-5y = -13$

$y = \frac{13}{5}$

$x + \frac{13}{5} = 7$

$x = \frac{-13 + 35}{5} = \frac{22}{5} = x$

$5x = 22$

$x = \frac{22}{5}$

$y = 7 - \frac{22}{5} = \frac{35 - 22}{5} = \frac{13}{5} = y$

$\frac{13}{5} = y$

