1) (a) vertex $(2,9)$
AOS $(x=2)$
max
Domain: $\mathbb{R}$
Range: $y \leq 9$

(b) vertex $(1,-2)$
AOS $x=1$
Domain: $\mathbb{R}$
range: $y \geq 1$

2) (a) shift right 6 and up 8

(b) shift left 4 and down 10

3) a) $y = ax^2+bx+c$

$(0,0)$ $0 = a(0)+b(0)+c$
$0 = c$

$(1,-2)$ $-2 = a(1)^2+b(1)+c$
$-2 = a+b+c$

$(-1,-4) =$ $-4 = a(-1)^2+b(-1)+c$
$-4 = a-b+c$

calculator $\{-3, 1, 0\}$
$y = -3x^2+1x+0$
$y = -3x^2+x+0$

b)
$(-2,9)$ $9 = (-2)^2a-2b+c$
$9 = 4a-2b+c$

$(-4,5)$ $5 = (-4)^2a-4b+c$
$5 = 16a-4b+c$

$(1,0)$ $0 = 1^2a+1b+c$
$0 = a+b+c$

calculator $\{-1, -4, 5\}$
$y = -x^2-4x+5$

4) (a) $f(x) = (5x+2)(x+8)$

F O I L
$5x \cdot x + 5x \cdot 8 + 2x + 2 \cdot 8$
$5x^2 + 40x + 2x + 16$
$5x^2+42x+16$

(b) $f(x) = (x+4)(x-7)$

	x	4
x	x^2	$4x$
-7	$-7x$	-28

$x^2-3x-28$

(5)(a) x^2+5x+4

$4 \cdot 1 = 5$

$(x+4)(x+1)$

(b) $x^2-5x-14$

$7 \cdot -2$

$-7 \quad 2$

$(x-7)(x+2)$

(c) $2x^2+13x+11$

$2 \cdot 11 = 22$

$2x^2+2x+11x+11$

$2x(x+1)+11(x+1)$

$(2x+11)(x+1)$

(d) $4x^2+15x+9$

$4 \cdot 9 = 36$

$12 \quad 3$

$4x^2+12x+3x+9$

$4x(x+3)+3(x+3)$

$(4x+3)(x+3)$

(7)(a) $x^2+15x+50$

$5 \quad 10$

$(x+5)(x+10)=0$

$x+5=0$ $\quad x+10=0$

$x=-5$ $\quad x=-10$

(7b) $3x^2+10x+8$

$3 \cdot 8 = 24$

$6+4=10$

$3x^2+6x+4x+8$

$3x(x+2)+4(x+2)$

$(3x+4)(x+2)$

$3x+4=0 \quad x+2=0$

$x=\frac{-4}{3} \quad x=-2$

(7c) $x^2+7x-18=0$

$9 \quad -2$

$-2 \cdot 9$

$(x-2)(x+9)=0$

$x=2 \quad x=-9$

(7d) graph to find $x=-2$

(9) $y=5x^2+4x-10$

$a=5 \quad b=4 \quad c=-10$

$\sqrt{4^2-4(5)(-10)}$

$\sqrt{16+200}$

$\sqrt{216}$

(9b) $y=2x^2+3x+12$

$a=2 \quad b=3 \quad c=12$

$\sqrt{3^2-4(2)(12)}$

$\sqrt{9-96}$

$\sqrt{-87}$

(10a) $\sqrt{-4} = \sqrt{4} \cdot \sqrt{-1} = 4i$

(10b) $4+\sqrt{-5} = 4+\sqrt{5}i$

(10c) $\sqrt{-10}+9 = 9+\sqrt{10}i$

(11a) $(10+13i)-(12-7i) = -2+20i$

(11b) $4+19+25i-9 = -5+25i$

(11c) $(8+3i)+(2-5i) = 10-2i$

12a $y = x^2 + 2x + 3$

$a=1 \quad b=2 \quad c=3$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{-2 \pm \sqrt{2^2-4(1)(3)}}{2(1)}$$

$$x = \frac{-2 \pm \sqrt{4-12}}{2}$$

$$x = \frac{-2}{2} \pm \frac{\sqrt{8}\,i}{2}$$

$x = -1 \pm 1.4i$

12b $y = x^2 - 4x + 5$

$a=1 \quad b=-4 \quad c=5$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{4 \pm \sqrt{(-4)^2-4(1)(5)}}{2(1)}$$

$$x = \frac{4 \pm \sqrt{16-20}}{2}$$

$$x = \frac{4}{2} \pm \frac{\sqrt{-4}}{2}$$

$x = 2 \pm i$

13a Graph and find ~~xx intercepts~~ intercepts using analyze tool

(-3,0) and (1,4) (1,2) and (2,3)

14a) 5th degree polynomial b) quadratic binomial c) 4th degree trinomial

15a) up and up b) up and down c) down and up

16a) graph and find zeroes

$x = -2$, $x = -1$, $x = 0$

$x = -0.4$, $x = 0$, $x = 0.88$

$x = -0.8$, $x = 0$, $x = 0.33$

18a) Graph only $x = 0.74$ is greater than 0

Graph $x = 1.26$

19a $7x^3+84x^2+140x$

$7x(x^2+12x+20)$

4 5
2 10

$7x(x+2)(x+10)$ ← factored

$7x=0 \quad x=0$

$x+2=0 \quad x=-2$

$x+10=0 \quad x=-10$

19b $(6x^3+15x^2)+(8x+20)$

$3x^2(2x+5) \quad 4(2x+5)$

$(3x^2+4)(2x+5)$ ← factored

20a $8x^3+88x^2+80x=0$

$8x(x^2+11x+10)=0$

$8x(x+10)(x+1)=0$

$8x=0 \quad x+10=0 \quad x+1=0$

$x=0 \quad x=-10 \quad x=-1$

b) $32x^3+8x^2+16x+4=0$

$8x^2(4x+1) \quad 4(4x+1)=0$

$(8x^2+4)(4x+1)=0$

$8x^2+4=0 \quad 4x+1=0$

$-4 \quad -4 \quad -1 \quad -1$

$8x^2=-4 \quad 4x=-1$

$\frac{8x^2}{8}=\frac{-4}{8} \quad x=-\frac{1}{4}$

$\sqrt{x^2}=\pm\sqrt{-\frac{1}{2}}$

$x=\sqrt{\frac{1}{2}}\cdot\sqrt{-1}$

$x=\pm\sqrt{\frac{1}{2}}\,i$