Determine which are polynomial functions. For those that are, state the degree and leading coefficient. For those that are not, explain why not.

1. $f(x) = 3x^{-5} + 17$

no – neg. exponent

2. $f(x) = -9 + 2x$

yes
deg = 1
l.c = 2

3. $f(x) = 2x^5 - \frac{1}{2}x + 9$

yes
deg = 5
l.c = 2

4. $f(x) = 13$

yes
deg = 0
l.c = 13

5. $h(x) = \sqrt[3]{27x^3 + 8x^6}$

no – cube root

6. $y(x) = 4x - 5x^2$

yes
deg = 2
l.c = −5

Write an equation for the linear function f satisfying the given conditions.

7. $f(-5) = -1$ and $f(2) = 4$

$y + 1 = \frac{5}{7}(x+5)$
or
$y - 4 = \frac{5}{7}(x-2)$
$\Big\rangle\ y = \frac{5}{7}x + \frac{18}{7}$

8. $f(-4) = 6$ and $f(-1) = 2$

$y - 6 = -\frac{4}{3}(x+4)$
OR
$y - 2 = -\frac{4}{3}(x+1)$
$\Big\rangle\ y = -\frac{4}{3}x + \frac{2}{3}$

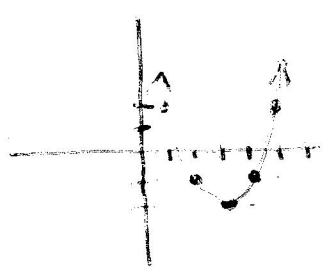
9. $f(0) = 3$ and $f(3) = 0$

$y - 3 = -1(x - 0)$
OR
$y - 0 = -1(x - 3)$
$\Big\rangle\ y = -x + 3$

Describe how to transform the graph of $f(x) = x^2$ into the graph of the given functions. Sketch each graph by hand.

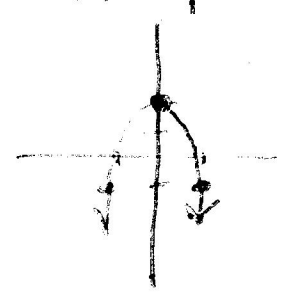
10. $g(x) = (x-3)^2 - 2$

right 3
down 2



11. $h(x) = -3x^2 + 2$

vertical stretch * 3
reflect over x-axis
shift up 2



Find the vertex and axis of symmetry for each function.

12. $f(x) = 3(x-1)^2 + 5$

V: $(1, 5)$

a.o.s.: $x = 1$

13. $f(x) = 5(x-1)^2 - 7$

V: $(1, -7)$

a.o.s.: $x = 1$

Find the vertex and axis of symmetry for each function. Rewrite the equation in vertex form:

14. $f(x) = 3x^2 + 5x - 4$

$f(x) = 3\left(x + \frac{5}{6}\right)^2 - \frac{73}{12}$

V: $\left(-\frac{5}{6}, -\frac{73}{12}\right)$

a.o.s.: $x = -\frac{5}{6}$

15. $f(x) = 8x - x^2 + 3$

$f(x) = -(x-4)^2 + 19$

V: $(4, 19)$

a.o.s. $x = 4$

Use completing the square to describe the graph of each function.

16. $f(x) = x^2 - 4x + 6$

$f(x) = (x-2)^2 + 2$

V: $(2, 2)$ a.o.s. $x = 2$

$y = x^2$ right 2
up 2

17. $f(x) = 10 - 16x - x^2$

$f(x) = -(x+8)^2 + 74$

V: $(-8, 74)$ a.o.s. $x = -8$

$y = x^2$ left 8
reflect over x-axis
up 74

18. $f(x) = 2x^2 + 6x + 7$

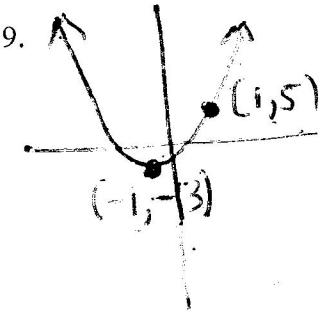
$f(x) = 2\left(x + \frac{3}{2}\right)^2 + \frac{5}{2}$

V: $\left(-\frac{3}{2}, \frac{5}{2}\right)$ a.o.s. $x = -\frac{3}{2}$

$y = x^2$ left $\frac{3}{2}$
vertical stretch $*2$
up $\frac{5}{2}$

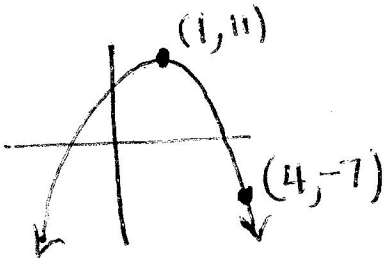
Write an equation for each parabola shown:

19.



$y = 2(x+1)^2 - 3$

20.



$y = -2(x-1)^2 + 11$