Pre-Calculus
No Calculator Practice Test

Name Key

Solve the polynomial equation. In order to obtain the first root, use synthetic division to test the possible rational roots.

1) $x^4 + 2x^3 - 12x^2 - 10x + 3 = 0$ p: ±1, ±3   q: ±1 $\frac{p}{q} = \pm 1, \pm 3$

pos reals: 2 or 0
neg reals: 2 or 0 $x^4 - 2x^3 - 12x^2 + 10x + 3$

$$\begin{array}{r|rrrrr} -1 & 1 & 2 & -12 & -10 & 3 \\ & & -1 & -1 & 13 & -3 \\ \hline 3 & 1 & 1 & -13 & 3 & \boxed{0} \\ & & 3 & 12 & -3 & \\ \hline & 1 & 4 & -1 & \boxed{0} & \end{array}$$

$x^2 + 4x - 1 = 0$

$x = \frac{-4 \pm \sqrt{4^2 - 4(1)(-1)}}{2(1)} = \frac{-4 \pm \sqrt{16+4}}{2} = \frac{-4 \pm 2\sqrt{5}}{2}$

1) $-1, 3, -2 \pm \sqrt{5}$

2) $x^3 - 5x^2 + 17x - 13 = 0$ p: ±1, ±13; q: ±1 $\frac{p}{q}$: ±1, ±13

$$\begin{array}{r|rrrr} 1 & 1 & -5 & 17 & -13 \\ & & 1 & -4 & 13 \\ \hline & 1 & -4 & 13 & \boxed{0} \end{array}$$

$x^2 - 4x + 13 = 0$

$x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(13)}}{2(1)} = \frac{4 \pm \sqrt{16-52}}{2}$

$\frac{4 \pm \sqrt{-36}}{2} = \frac{4 \pm 6i}{2} =$

2) $1, 2 \pm 3i$

Graph the polynomial function.

3) $f(x) = x^3 + 7x^2 - x - 7$

$x^2(x+7) - 1(x+7)$

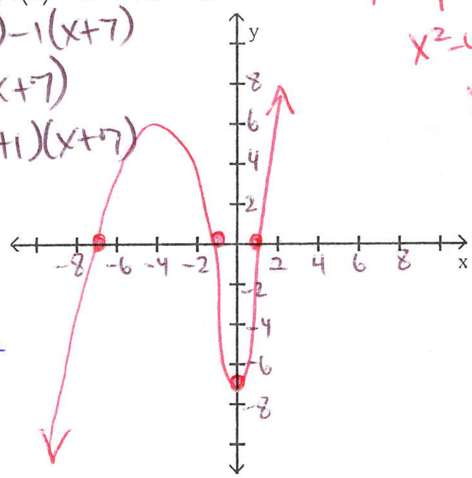
$(x^2-1)(x+7)$

$0 = (x-1)(x+1)(x+7)$

$x = 1, -1, -7$

y-int: -7

$f(0) = 0^3 + 7(0)^2 - (0) - 7$



3) see left

Use the vertex and intercepts to sketch the graph of the quadratic function.

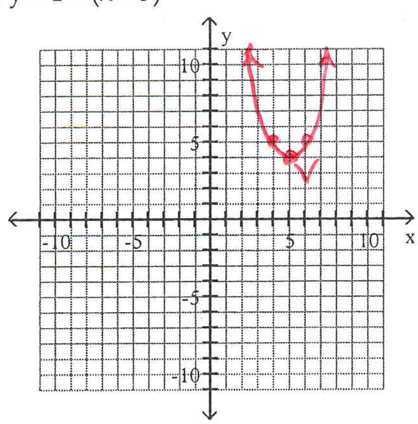
4) $y - 4 = (x - 5)^2$

$y = a(x-h)^2 + k$
V: (h, k)

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

V: (5, 4)

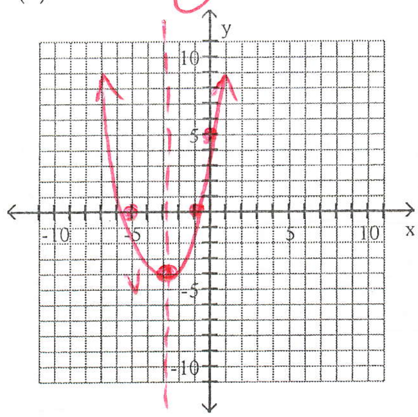
x	y
0	$(0-5)^2+4=29$
4	$(4-5)^2+4=5$



4) see left

axis of Symm $X = \frac{-b}{2a}$

5) $f(x) = x^2 + 6x + 5$ y-int



axis of Sym: $X = \frac{-(6)}{2(1)} = -3$

$f(-3) = (-3)^2 + 6(-3) + 5$

$= 9 - 18 + 5 = -4$

$V: (-3, -4)$

Xint

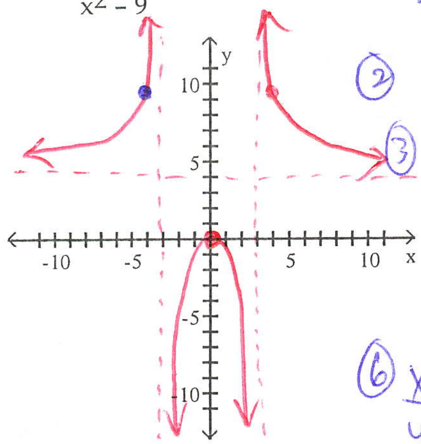
$(X+5)(X+1) = 0$

$X = -5, -1$

5) See left

Graph the rational function.

6) $f(x) = \dfrac{4x^2}{x^2 - 9}$



① Symm? $\frac{4(-x)^2}{(-x)^2 - 9} = \frac{4x^2}{x^2 - 9} \rightarrow$ y-axis Sym

② y-int: $f(0) = \frac{4(0)^2}{0^2 - 9} = 0$

③ X-int: $f(x) = 0 = \frac{4x^2}{x^2 - 9}$ 0

④ V.A. = $x^2 - 9 = 0$ $X = 3, -3$

⑤ H.A. = $y = 4$

⑥

X	-4
y	$\frac{4(-4)^2}{(-4)^2 - 9}$ 14 $\frac{64}{7}$

6) See left