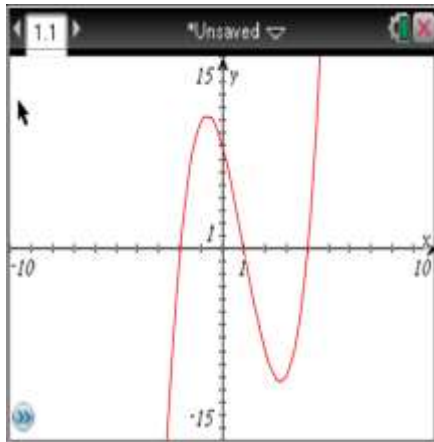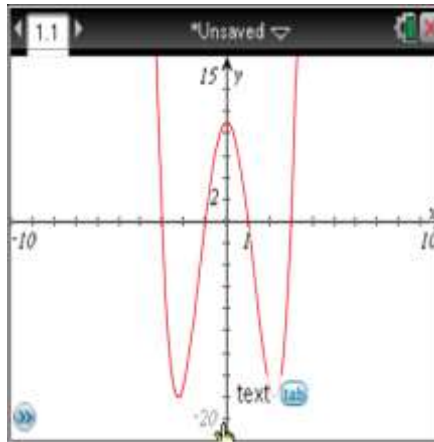**Non-Calculator**

Write a function that fits each graph in problems 1-3.
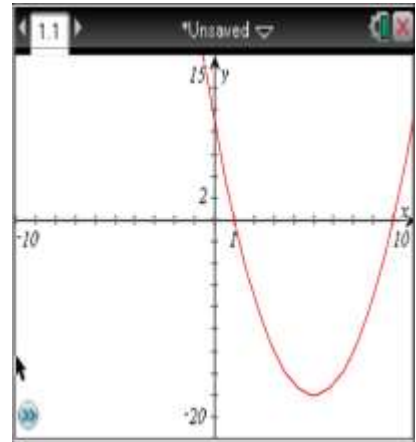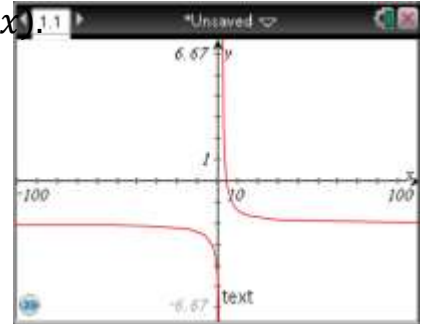
1)　　　　　　　　　　　2)　　　　　　　　　　　3)

4) Solve the quadratic equation two different ways: $5x^2 - 2x - 3 = 0$

5) Given $x = 4$ is a root, find the rest of the zeros for $f(x) = x^3 + x^2 - 16x - 16$.

6) Determine the polynomial of least degree given the zeros $3 - i$ and -2.

7) Determine how many complex zeros there are for $g(x) = 3x^4 - 6x^2 + 5x - 11$ and explain your reasoning.

8) Given the graph, determine the$\lim_{x \to -\infty} g(x)$ and $\lim_{x \to \infty} g(x)$

9) Determine the end behavior in problems 1 and 2.

10) Write a polynomial function of least degree in factored form with the following zeros: -2, 0, 1, and $\frac{3}{5}$

11) Write a polynomial function in factored form that has a zero of 0 with multiplicity of 2, a zero of -3 with multiplicity of 3, and a zero of 1 with multiplicity of 2.

12) $P(x) = -2x^4 + ax^3 - 3x^2 + bx - 15$. $P(x)$ is divisible by $x - 3$. $P(x)$ has a remainder of -32 when divided by $x + 1$. Find a and b.

Calculator

13) Solve for q: $2q^3 - 10q = 5$

14) Find the solutions of the following equation: $c^2 + 3 = c$

15) Determine all complex zeros for $w(x) = x^4 - 8x^2 - 9$.

16) How many real zeros are there for $b(x) = 2x^3 + 3x^2 + 3x + 9$? How many are imaginary?

17) Describe the end behavior of $m(x) = -2x^3 - x + 1$.

18) Find the vertical and horizontal asymptotes for:

a) $h(x) = \frac{x-5}{x+3}$ b) $k(x) = \frac{x+3}{x^2-5x-24}$ c) $n(x) = \frac{3x}{x^2-2x-24}$

ANSWERS

1. $x^3 - 3x^2 - 6x + 8 = f(x)$
2. $g(x) = x^4 - 10x^2 + 9$
3. $b(x) = x^2 - 10x + 9$
4. $\quad$ -4,-1
5. $x^3 - 4x^2 - 2x + 20 = v(x)$
6. $\quad$ 4
7. -2
8. -1.92, -0.53, 2.45
9. $\frac{1}{2} + \frac{i\sqrt{11}}{2}$, $\frac{1}{2} - \frac{i\sqrt{11}}{2}$
10. Vertical: x=-3, Horizontal: y=1
11. -3, 3 ,i ,-i
12. 1
13. $\lim_{x \to -\infty} m(x) = \infty$, $\lim_{x \to \infty} m(x) = -\infty$