STATION 1

Simplify the following

1. $\left(4x^{5}\right)^{3}$

2. $\left(\dfrac{3a^{3}b^{-6}c^{7}}{2z^{-4}b^{-4}c^{4}}\right)^{2}$

3. $\dfrac{4x^{2}y}{xy^{3}} \cdot \dfrac{y^{5}}{8x^{3}}$

4. $(3x^{2} + 5x - 7) - (4x^{2} - 2x + 3)$

5. $(x - 4)(x + 2)(x - 1)$

6. $(3x - 4y)^{2}$

Station 2

7. Divide using synthetic division

$$(3x^4 - 2x^2 + 4x - 1) \div (x + 2).$$

8. Divide using polynomial long division

$$(2x^4 + 3x^3 - 2x + 5) \div (x - 3)$$

9. List all the possible roots given by the rational root theorem. $f(x) = 6x^2 + 5x - 10$

10. Describe the end behavior of the function

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

Station 3

11. For the function $f(x) = 6x^2 + 2x^4 - 7x + 5$ ...

A) What is the lead coefficient?
B) What is the constant term?
C) What is the degree?
D) What is the type?

12. Use your calculator to estimate the zeros of the equation $f(x) = x^3 + 2x^2 - 5x - 2$

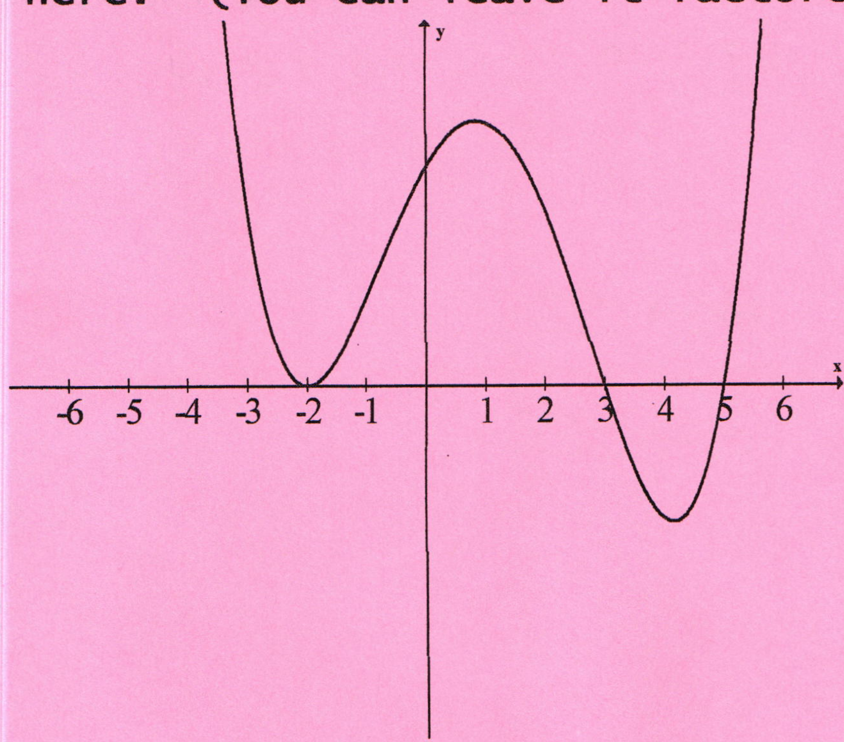
13. Use your calculator to estimate the local max and local min of the function $f(x) = x^3 + 2x^2 - 5x - 2$

14. Draw a diagram of a function with a double root at x = 2.

15. Draw a diagram of a function with a triple root at x = 2.

16. How can you tell from a graph if a function has an imaginary root?

17. Write a possible equation for the function shown here. (You can leave it factored)



Station 4

Factor each of the following.

18. $5x^3 - 45x$

18. $x^{30} - 5x^{15} - 14$

19. $6x^3 + 21x^2 - 10x - 35$

20. $8x^3 + 125y^6$

21. $16x^2 - 9$

22. $2x^2 - 5x - 3$

STATION 5

23. Find all the zeros (real and imaginary). You must show the synthetic division.

$$f(x) = x^5 + 2x^4 - 7x^3 - 4x^2 - 44x - 48$$

24. Write the equation of least degree, in standard form that has roots 4, 7, and 9.

1 $64x^{15}$

2 $\dfrac{9a^6c^6z^8}{4b^4}$

3 $\dfrac{y^3}{2x^2}$

4 $-x^2+7x-10$

5 x^3-3x^2-6x+8

6 $9x^2-24xy+16y^2$

did you miss the
middle term?
you must FOIL!

7

$\underline{-2}\rfloor$	3	0	-2	4	-1
		-6	12	-20	32
	3	-6	10	-16	$\boxed{31}$

$$3x^3-6x^2+10x-16+\frac{31}{x+2}$$

8

$$2x^3+9x^2+27x+79+\frac{242}{x-3}$$

$$x-3\overline{)2x^4+3x^3-2x+5}$$

$$-\underline{2x^4-6x^3}$$

$$9x^3+0x^2-2x+5$$

$$-\underline{9x^3-27x^2}$$

$$27x^2-2x+5$$

$$-\underline{27x^2-81x}$$

$$79x+5$$

$$-\underline{79x-237}$$

$$242$$

9

6	10
1, 2, 3, 6	1, 2, 5, 10

$\longrightarrow$ $\pm 1, \pm 2, \pm 5, \pm 10, \pm \frac{1}{2}, \pm \frac{5}{2}, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{5}{3}, \pm \frac{10}{3}, \pm \frac{1}{6}, \pm \frac{5}{6}$

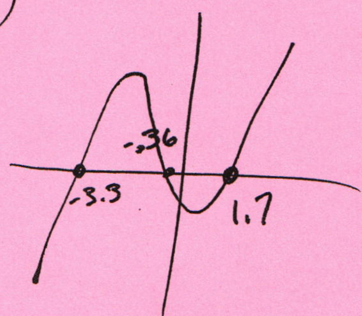
10

as $x \to -\infty$, $f(x) \to \underline{\infty}$

as $x \to \infty$, $f(x) \to \underline{-\infty}$

(11) A) 2
B) 5
C) 4
D) Cuartic

(12)



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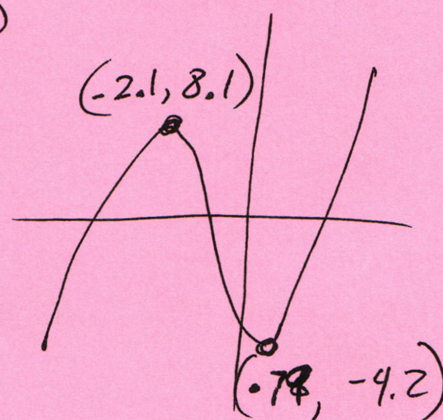

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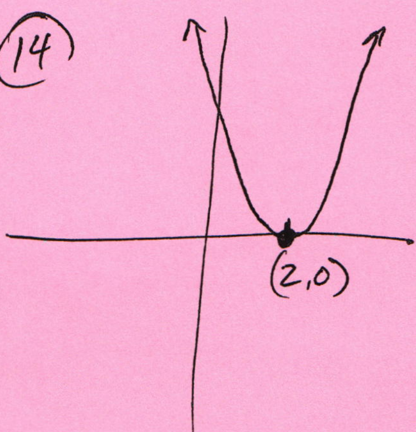

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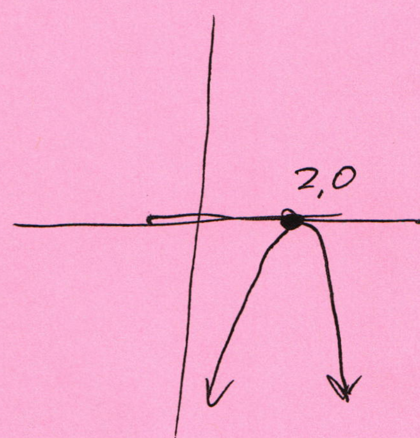

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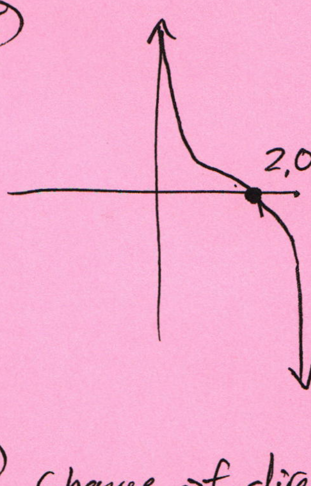

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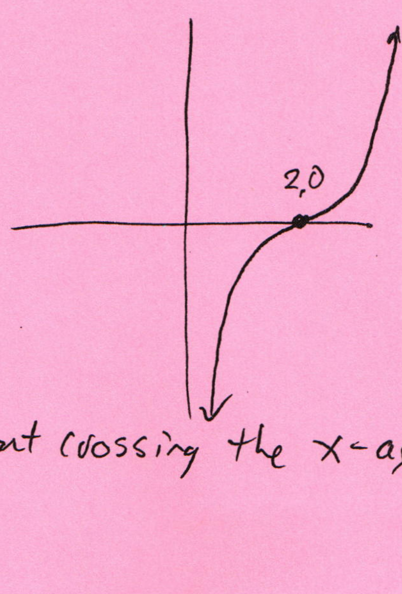

(16) change of direction without crossing the x-axis

(17) $(x+2)^2(x-3)(x-5)\cdot C$

(18) $5x^3 - 45x$

$(5x)(x^2 - 9)$

$(5x)(x+3)(x-3)$

(19) $x^{30} - 5x^{15} - 14$

$(x^{15} - 7)(x^{15} + 2)$

~~20~~ (19) $(6x^3 + 21x^2) + (-10x - 35)$

$3x^2(2x + 7) + {}^{-}5(2x + 7)$

$(3x^2 - 5)(2x + 7)$

(20) $8x^3 + 125y^6$

$a = 2x$

$b = 5y^2$

$(2x + 5y)(4x^2 - 10xy + 25y^2)$

(21) $16x^2 - 9$

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

(22)

$2x^2 - 5x - 3$

$2x^2 + 6x - 1x - 3$

$(2x^2 + 6x) + (-1x - 3)$

$2x(x + 3) + {}^{-}1(x + 3)$

$(2x - 1)(x + 3)$

(23) guesses from graph: $-4, -1, 3$

$$
\begin{array}{r|rrrrrr}
3 & 1 & 2 & -7 & -4 & -44 & -48 \\
  &   & 3 & 15 & 24 & 60 & 48 \\
\hline
-1 & 1 & 5 & 8 & 20 & 16 & \boxed{0} \\
  &   & -1 & -4 & -4 & -16 & \\
\hline
-4 & 1 & 4 & 4 & 16 & \boxed{0} & \\
  &   & -4 & 0 & -16 & & \\
\hline
  & 1 & 0 & 4 & \boxed{0} & &
\end{array}
$$

$1x^2 + 0x + 4$

can be solved by Quadratic formula, complete the square or taking the square root.

$x^2 + 4 = 0$

$x^2 = -4$

$x = \pm 2i$

Solutions: $3, -1, -4, 2i, -2i$

(24) $(x-4)(x-7)(x-9)$

$= x^3 - 20x^2 + 127x - 252$