Name Key

Test 2.3-2.6 REVIEW

Block______ Date______

1. Use the rational zero test to list the possible rational zeros of the function $f(x)=6x^3+15x^2+3x-24$.

$$\frac{p}{q}=\frac{\pm1,\pm24,\pm2,\pm3\ \pm4\ \pm6,\pm12,\pm8}{\pm1,\pm2,\pm3,\pm6}=\pm\left(1,\tfrac{1}{2},\tfrac{1}{3},\tfrac{1}{6},24,12,8,4,2,\tfrac{2}{3},3,\tfrac{3}{2},\cancel{4},\tfrac{4}{3},6,\tfrac{8}{3}\right)$$

2. List the possible zeros of $g(x)=2x^3-3x+1$

$$\frac{p}{q}=\frac{\pm1}{\pm2}=\pm1,\ \pm\frac{1}{2}$$

3. Find the actual zeros using synthetic division, and then continue or use factoring to find the remaining zeros. or quad. formula

$$\begin{array}{r|rrrr} 1 & 2 & 0 & -3 & 1 \\ & \downarrow & 2 & 2 & -1 \\ \hline & 2 & 2 & -1 & \boxed{0} \end{array}$$

$\underset{a}{2}x^2+\underset{b}{2}x-\underset{c}{1}=0$

$$x=\frac{-2\pm\sqrt{(2)^2-4(2)(-1)}}{2(2)}=\frac{-2\pm\sqrt{12}}{4}=\frac{-2\pm2\sqrt{3}}{4}=\frac{-1\pm\sqrt{3}}{2}=-\frac{1}{2}\pm\frac{\sqrt{3}}{2}$$

roots/zeros: $1,\ -\frac{1}{2}+\frac{\sqrt{3}}{2},\ -\frac{1}{2}-\frac{\sqrt{3}}{2}$

Use the following polynomial to answer the questions below, $f(x)=-4x^3+15x^2-8x-3$

4. How many zeros/roots/x-intercepts/solutions will the following function have?

3

5. Using the rational zero test, list the **possible** roots using p/q:

$$\frac{p}{q}=\frac{\pm1,\ \pm3}{\pm1,\ \pm2,\ \pm4}=\pm1,\ \pm\frac{1}{2},\ \pm\frac{1}{4},\ \pm\frac{3}{2},\ \pm\frac{3}{4},\ \pm3$$

6. Use the list above to find at least one zero using synthetic division. Continue or use quadratic formula, until you have all of the zeros of the function.

$$\begin{array}{r|rrrr} 1 & -4 & 15 & -8 & -3 \\ & \downarrow & -4 & 11 & 3 \\ \hline & -4 & 11 & 3 & \boxed{0} \end{array}$$

$-4x^2+11x+3=0$

$$x=\frac{-11\pm\sqrt{121-4(-4)(3)}}{2(-4)}=\frac{-11\pm\sqrt{169}}{-8}=\frac{-11\pm13}{-8}=$$

$\frac{-11+13}{-8}$ & $\frac{-11-13}{-8}$

$\frac{2}{-8},\ \frac{-24}{-8}$

$-\frac{1}{4},\ +3$

$\boxed{\text{Zeros: } 1,\ -\tfrac{1}{4},\ 3}$

7. Write the polynomial as a product of linear factors.

$f(x)=(x-1)(4x+1)(x-3)$

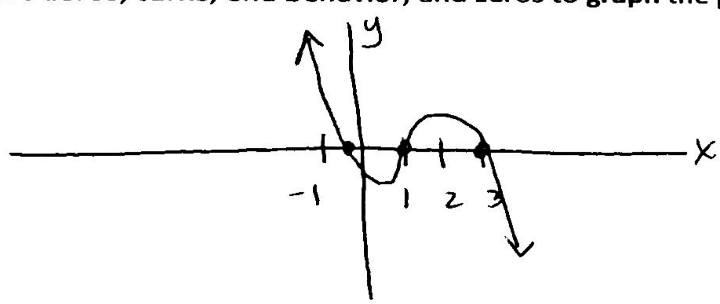
8. Use the leading coefficient test to determine the end behavior of the polynomial.

up to the left, down to the right

9. How many turns should it have?

2 turns

10. Use the zeros, turns, end behavior, and zeros to **graph** the polynomial.



Perform the indicated operation and write the result in the form a+ bi. Remember: $i^2 = -1$ (circle answers)

8. $-12i + 8 + 23 - 7i$ $= -19i + 31$ or $\boxed{31 - 19i}$

9. $(-15i - 7) - (-3 - 5i)$ $= -15i - 7 + 3 + 5i = \boxed{-4 - 10i}$

10. Evaluate a. i^{12} b. i^{120} c. i^{121}

a. 1 b. 1 c. i

11. Find the complex conjugate of $7 + 12i$ and then multiply by it.

$\boxed{7 - 2i}$

$(7+12i)(7-12i)$

$49 + 98i - 98i - 144i^2$

$49 + 144 = 193$

12. Write the quotient in standard form.

$\frac{(5-2i)(3-9i)}{(3+9i)(3-9i)} = \frac{15 - 6i - 45i + 18i^2}{9 + 27i - 27i - 81i^2} = \frac{15 - 51i - 18}{9 + 81} = \frac{-3 - 51i}{90} = \frac{-1}{30} \frac{-51i}{90}$

$\boxed{\frac{-1}{30} - \frac{17i}{30}}$

13. Use the quadratic formula to find the zeros $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$1x^2 - 4x + 16 = 0$
a b c

$x = \frac{4 \pm \sqrt{(-4)^2 - 4(1)(16)}}{2(1)} = \frac{4 \pm \sqrt{16 - 64}}{2} = \frac{4 \pm \sqrt{-48}}{2} = \frac{4 \pm i4\sqrt{3}}{2} =$

$\boxed{2 \pm 2i\sqrt{3}}$

14. Identify the remaining zero of a polynomial of degree 6 whose coefficients are real numbers that has the zeros: 6, -2, 4i, -10i

$\boxed{-4i \ \& \ 10i}$

15. How many zeros should $f(x) = 4x^3 + 4x^2 + 9x + 9$? What are all of the combinations of the number of real zeros and imaginary zeros it could have?

$\boxed{\text{3 zeros}}$ $\boxed{\text{3 real; 2 imag/1 real}}$

16. Find the actual zeros of the polynomial, $f(x) = 4x^3 + 4x^2 + 9x + 9$

$\boxed{-1, \frac{3i}{2}, -\frac{3i}{2}}$

$4x^2(x+1) + 9(x+1) = 0$

$(x+1)(4x^2+9) = 0$

$x+1=0$

$\boxed{x=-1}$

$4x^2 + 9 = 0$

$4x^2 = -9$

$x^2 = \frac{-9}{4}$

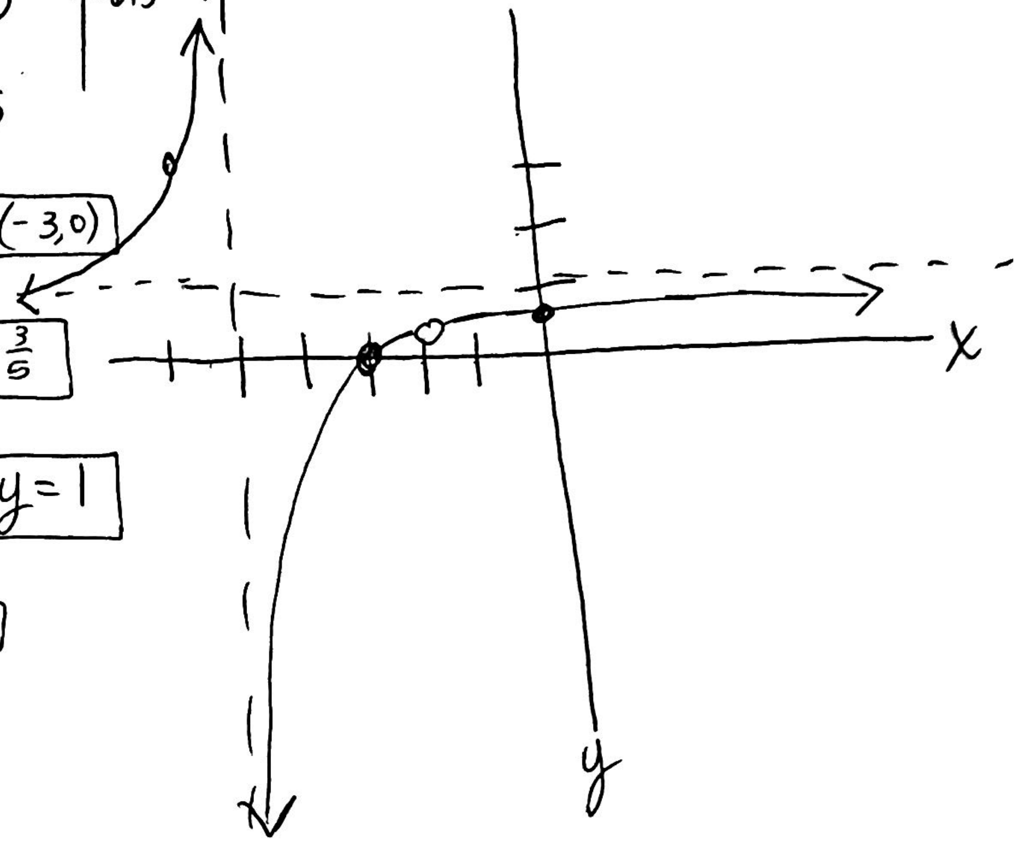
$x = \sqrt{\frac{-9}{4}} = \boxed{\pm \frac{3}{2} i}$

Find the domain, range, x and y intercepts, horizontal and vertical asymptotes any additional points as needed to graph:

$f(x) = \frac{x^2+5x+6}{\text{[redacted]}}$ $x^2+7x+10$ $\frac{\cancel{(x+2)}(x+3)}{\cancel{(x+2)}(x+5)}$

x	y
-6	$\frac{-6+3}{-6+5} = \frac{-3}{-1}$ = 3

22. Graph below



17. Domain:

$\mathbb{R}$, $x \neq -2$, $x \neq -5$
hole VA

18. x int =

$f(x) = \frac{x+3}{x+5}$ $= 0 \Rightarrow x = -3$ $\boxed{(-3,0)}$

19. y int = $f(x) = \frac{x+3}{x+5} = \frac{0+3}{0+5} = \frac{3}{5}$ $\boxed{0, \frac{3}{5}}$

20. HA: BETC $f(x) = \frac{1x+3}{1x+5}$ $\boxed{y=1}$

$f(x) = \frac{x+3}{}$

VA: $x+5 \Rightarrow 0 \Rightarrow \boxed{x=-5}$

21. Hole: $\boxed{\left(-2, \frac{1}{3}\right)}$

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

↑ from cancelled factor $(x+2)=0$
$x=-2$

22. Determine if the following have a slant asymptote. If so, find the slant asymptote, if not, find the horizontal asymptote. Find the vertical asymptotes.

a. $f(x) = \frac{2x^2+1}{x}$ $\boxed{x=0 \text{ VA}}$

BOTU

SLANT

$$\begin{array}{r} 2x+0 \\ x\,\overline{)\,2x^2+0x+1} \\ 2x^2 \\ \hline 0+0x \end{array}$$

SA: $\boxed{y=2x}$

b. $g(x) = \frac{x^2}{3x+1}$ $= 0 \Rightarrow$ $\boxed{x=-\frac{1}{3} \text{ VA}}$

BOTU

SLANT

$$\begin{array}{r} \frac{1}{3}x-\frac{1}{9} \\ 3x+1\,\overline{)\,\cancel{x^2}+0x+0} \\ -\,\cancel{x^2}+\frac{1}{3}x \\ \hline -\frac{1}{3}x+0 \end{array}$$

SA: $\boxed{y=\frac{1}{3}x-\frac{1}{9}}$

c. $h(x) = \frac{5}{4x-1}$ $= 0 \Rightarrow$ $\boxed{\text{VA } x=\frac{1}{4}}$

BOBO

$\boxed{\text{HA}: y=0}$