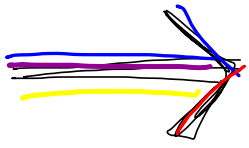
June 11, 2019

Pick Up

the WARM Up

HW Help



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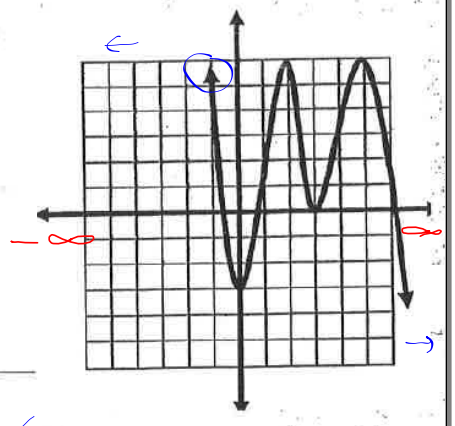
warm up

Use the graph to the right to answer the following:



a. End Behavior: As $x \to +\infty$, $f(x) \to -\infty$

As $x \to -\infty$, $f(x) \to +\infty$

b. Least Degree of polynomial: 5

c. Domain: $-\infty < x < \infty$ ✓

Range: $-\infty < y < \infty$

(2) Use the discriminate (b^2-4ac), to determine the nature of the roots of $y = x^2 + x + 5$

$a = 1$
$b = 1$
$c = 5$

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$(1)^2 - 4(1)(5)$$

$$x = \frac{-1 \pm \sqrt{\quad}}{2}$$

-19 2 complex

19 2 real

0 1 real root is repeated

③ Re-read the Remainder Theorem (as shown on the Polynomial Notes given in class yesterday. Then answer the following questions about $p(x) = x^3 - 6x^2 + 7x + 2$

a) What is $p(2)$? $P(2) = 0$. So $x = 2$ is a root

b) Use the remainder theorem to find one factor of $p(x)$

c) Now divide to find another factor.

root 2 | 1 -6 7 2

2 -8 -2

1 -4 -1 (0)

$\frac{x^3 - 6x^2 + 7x + 2}{x - 2} =$

$x^2 - 4x - 1$

$3x - 2$

$x^2 - 2$

④ Use long division to divide

$$\frac{2x^3 - 3x^2 + 4x - 5}{x - 1}$$

$$2x^2 - x + 3 + \frac{-2}{x-1} \quad \text{or} \quad -\frac{2}{x-1}$$

$$x - 1 \overline{)\, 2x^3 - 3x^2 + 4x - 5}$$

$$-(2x^3 - 2x^2)$$

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

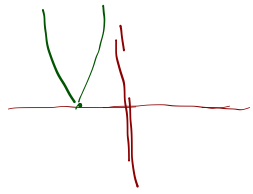
$$-(-x^2 + x)$$

$$3x - 5$$

$$+(3x - 3)$$

$$-2$$

Questions on homework ?



(32c) $x^4 + 2x^3 + 10x^2 + 18x + 9$

-1	1	2	10	18	9
	↓	-1	-1	-9	-9
-1	1	1	9	9	0
	↓	-1	0	-9	
	1	0	9	0	

No remainder

No remainder -1 is a root!

$x^2 + 9 = 0$

$x^2 = -9$

$x = \pm 3i$

$x = -1$ (double), $3i, -3i$

Two goals for the day

In this Chapter (with imaginary numbers)

Added $2i + 3i$ or $(3+2i)+(6+2i)$

subtracted $5i - 2i$ or $(2+5i)-(3-2i)$

multiplied $(6i)(2i)^2$ or $(2+3i)(2-3i)$

The final operation

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Divide two complex numbers

(a very abstract skill)

$$\frac{7+3i}{1-i}\cdot\frac{1+i}{1+i} = \frac{7+7i+3i+3i^2}{1-i^2} = \frac{4+10i}{2}$$

$i^2 = -1$

Multiply by the conjugate of the divisor

$$= \frac{4}{2} + \frac{10i}{2}$$

$$= 2+5i$$

a little more complicated

$$\frac{-3+i}{2+3i} \cdot \frac{2-3i}{2-3i} = \frac{-6+9i+2i-3i^2}{4-9i^2} = \frac{-3+11i}{13}$$

$i^2 = -1$

conjugate

$2-3i$

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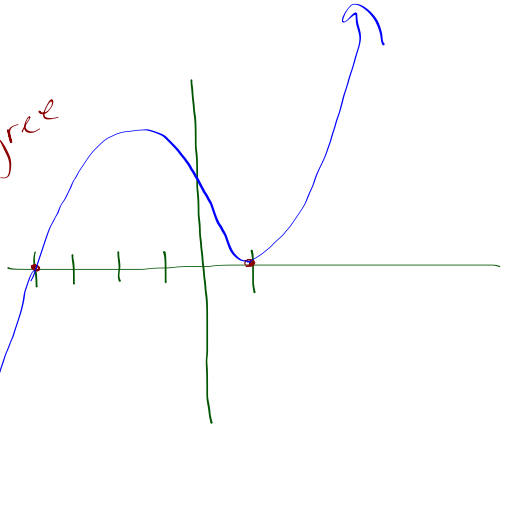
Goal 2

Create a polynomial including its stretch factor given misc. clues.

Sketch the following polynomial

1. has a single root of -4
2. has a double root of 1
3. passes through (5, 96)

3rd degree



Now write the function

$y = a(x-1)^2(x+4)$

$96 = a(5-1)^2(5+4)$

$96 = a(4)^2(9)$

$96 = a\,144$

$a = \frac{96}{144}$

$a = \frac{2}{3}$

$$y = \frac{2}{3}(x-1)^2(x+4)$$

Polynomial G(x)

1. has a single roots of 6 and 0
2. has an x-intercept of 2
3. The degree of G(x) is 5
4. passes through (10, 1024)

Polynomial G(x)

1. has a single roots of 6 and 0
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.05

find $P(x) = a(x)(x-6)(x-2)^3$

$1024 = a(10)(10-6)(10-2)^3$

$1024 = 20480a$

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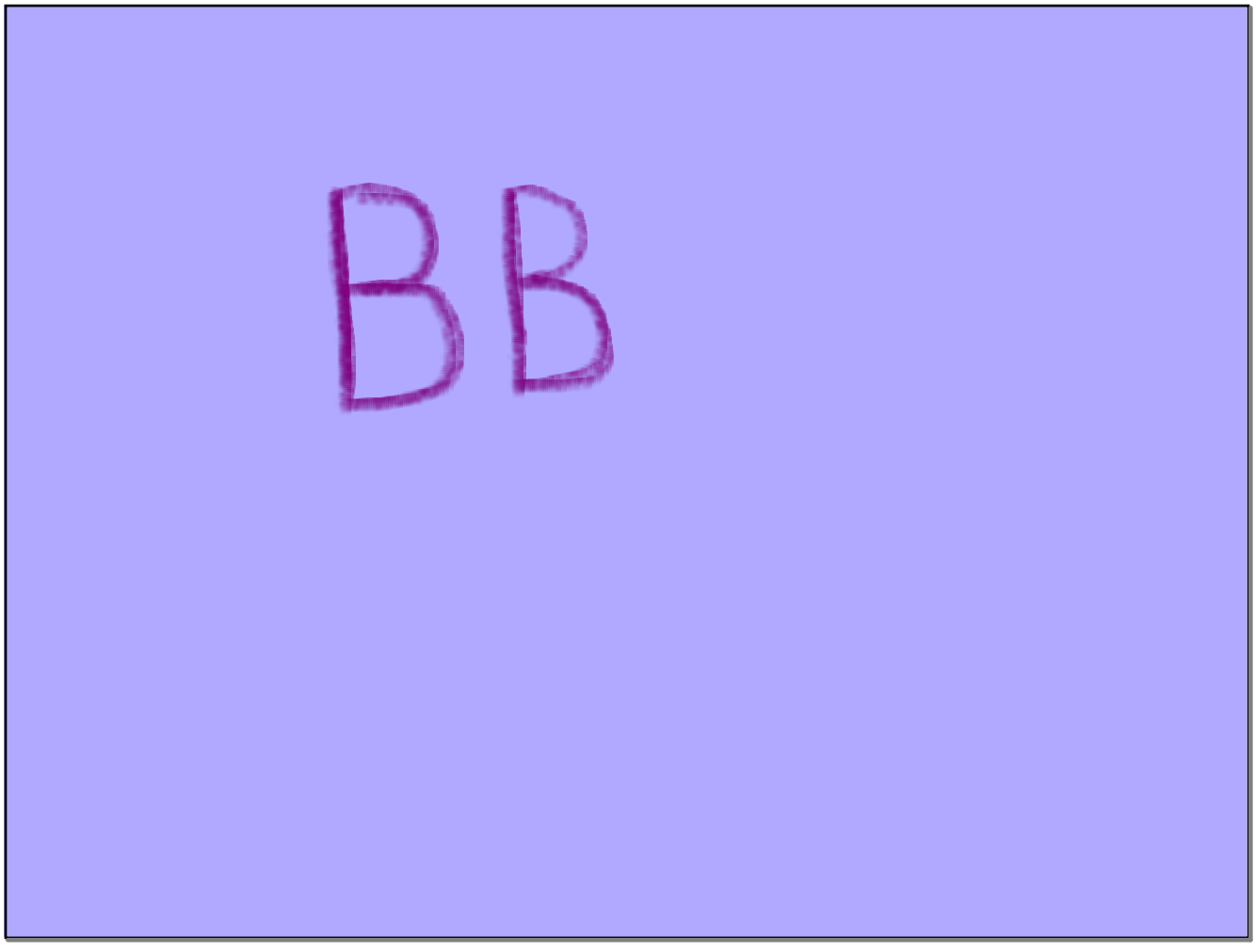

Extra Practice Available
(on many things, but not all)

Final Exam Test Information
Sheet is now available

LCQ

8.... 138, 141a, 147, 152a, 160, 175, 176

8-138 Carlo $p(x) = x^4 - 4x^3 - 4x^2 + 24x - 9$

Carlo divided $p(x)$ by $(x-3)$ once to get

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

a) From the graph you can see that 3 is a double root so $(x-3)$ is a double factor, or $(x-3)^2$ which tells Carlo to divide a second time by $(x-3)$

b) $$\frac{x^3 - x^2 - 7x + 3}{x-3} = x^2 + 2x - 1$$

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

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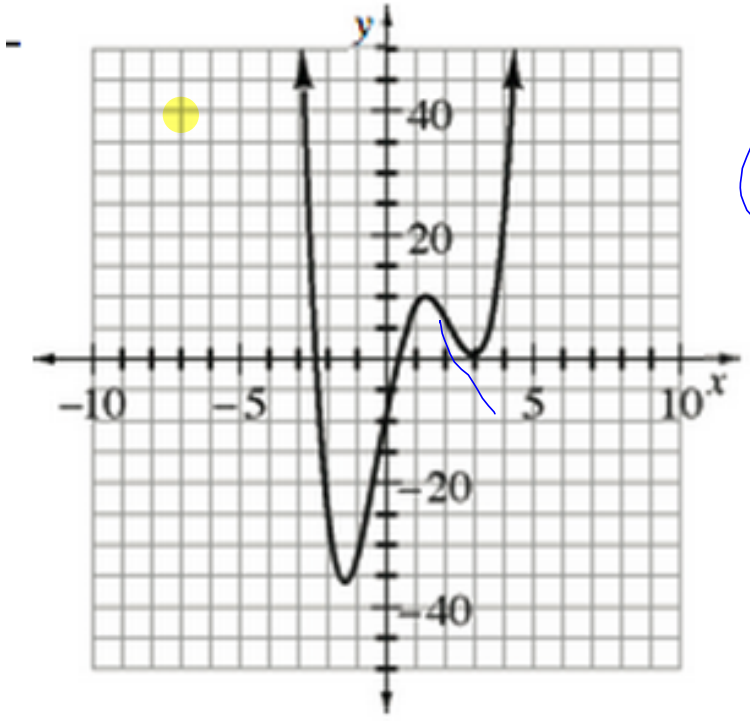

$(x-3)(x-3)$

So.... $p(x) = (x-3)^2(x^2+2x-1)$

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

$a=1 \quad b=2 \quad c=-1$

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

$$x = \frac{-2 \pm \sqrt{8}}{2} = \frac{-2+2\sqrt{2}}{2}$$

$$x = -1 \pm \sqrt{2}$$

The roots

$x = 3$ (double root)

$x = -1 \pm \sqrt{2}$

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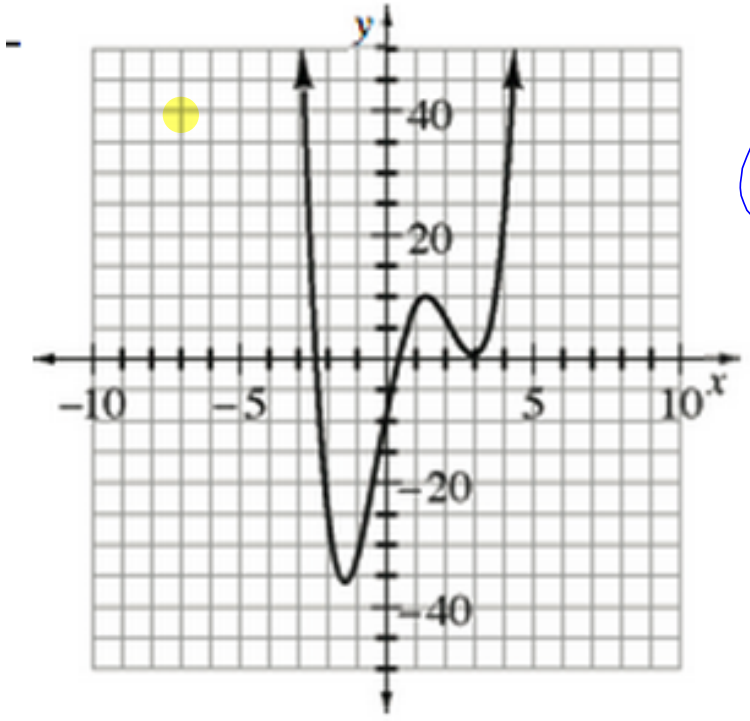

$(x-3)^2$

$(x-3)(x-3)$

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