$y=\frac{11}{4}(x+3)+2 \rightarrow \frac{11}{4}x+\frac{33}{4}+\frac{2}{1} \rightarrow \frac{11}{4}x+\frac{33}{4}+\frac{8}{4}$ $y=\frac{11}{4}x+\frac{41}{4}$

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SBM 2 Review

Identify the vertices, foci, and asymptotes of each.

1) $\frac{(y-2)^2}{121}-\frac{(x+3)^2}{16}=1$

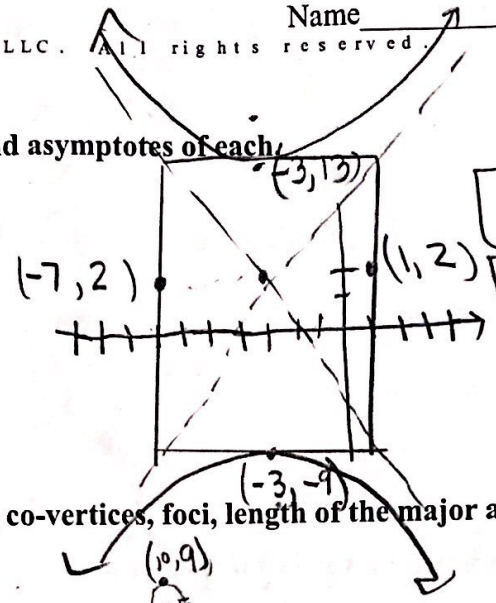
C(-3,2)

a=11

b=4

$c=\sqrt{121+16}$

$c=\sqrt{137}$



V(-3,13) (-3,-9)

Foci $(-3, 2\pm\sqrt{137})$

Asymptotes

$y=\pm\frac{11}{4}(x+3)+2$

$y=-\frac{11}{4}(x+3)+2$

$=-\frac{11}{4}x-\frac{33}{4}+\frac{8}{4}$

$y=-\frac{11}{4}x-\frac{25}{4}$

Identify the center, vertices, co-vertices, foci, length of the major axis, and length of the minor axis of each.

2) $\frac{(x-10)^2}{144}+\frac{(y+5)^2}{196}=1$

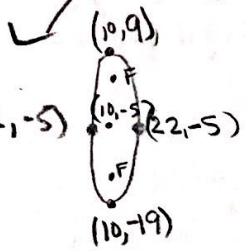
C(10,-5)

a=14

b=12

V(10,9)(10,-19)

CV(22,-5) (-2,-5)



$c^2=196-144$

$c=\sqrt{52}=2\sqrt{13}$

$F(10,-5\pm2\sqrt{13})$

Length of major axis = 28 units

Length of minor axis = 24 units

Identify the vertex, focus, axis of symmetry, and directrix of each.

3) $y=7(x+9)^2+3$

V(-9,3)

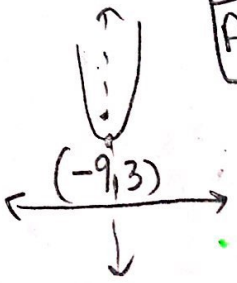
$F(-9,3\frac{1}{28})$

$F(-9,\frac{85}{28})$

$\frac{1}{4p}=\frac{7}{1}$

$28p=1$

$p=\frac{1}{28}$



AOS: x = -9

directrix

$y=\frac{3}{1}-\frac{1}{28}$

$\frac{84}{28}-\frac{1}{28}$

$y=\frac{83}{28}$

Identify the center and radius of each.

4) $(x-5)^2+(y+11)^2=24$

C(5,-11)

$r=\sqrt{24}$

$r=2\sqrt{6}$

Identify the conic and write the standard form equation of each.

ellipse

5) $x^2+4y^2-14x+40y+5=0$

$x^2-14x+\frac{49}{}+4(y^2+10y+25)=-5+\frac{49}{}+100$

$\frac{(x-7)^2}{144}+\frac{4(y+5)^2}{144}=\frac{144}{144}$

$\frac{(x-7)^2}{144}+\frac{(y+5)^2}{36}=1$

6) $x^2+y^2+30x-20y+316=0$

$x^2+30x+\frac{225}{}+y^2-20y+\frac{100}{}=-316+225+100$

$(x+15)^2+(y-10)^2=9$

circle

$x^2+12x+36-4(y^2+4y+4)=80+36+-16$

$(x+6)^2-4(y+2)^2=100$

7) $x^2-4y^2+12x-16y-80=0$

100 100 100

$\frac{(x+6)^2}{100}-\frac{(y+2)^2}{25}=1$ hyperbola

$x-154=3y^2-42y$

$x-154=3(y^2-14y+\_\_)$

8) $-3y^2+x+42y-154=0$

$x-154+147=3(y^2-14y+49)$

$x-7=3(y-7)^2$

$x=3(y-7)^2+7$ parabola

Use the information provided to write the standard form equation of each circle.

9) Center: $(-1, -4)$
Radius: $\sqrt{95}$

$(x+1)^2+(y+4)^2=95$

$\frac{1}{4(-8)}$

$\frac{1}{-4}$

$\frac{1}{-2}$

-2

$x=-2(y-7)^2-6$

$p=F-V$

Use the information provided to write the vertex form equation of each parabola.

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

10) Vertex: $(5, -6)$, Focus: $(5, -5)$

$p=-5-(-6)$

$p=1$

$y=\frac{1}{4}(x-5)^2-6$

$\frac{1}{4(1)}=\frac{1}{4}$

11) Focus: $\left(-\frac{49}{8}, 7\right)$, Directrix: $x=-\frac{47}{8}$

Vertex $(\_\_, 7)$

$\frac{-\frac{49}{8}+\frac{-47}{8}}{2}$

$\frac{-12}{2}$

-6

$V(-6,7)$

$p=V-D$

$=-6-\left(-\frac{47}{8}\right)$

$=-6+\frac{47}{8}$

$=-\frac{48}{8}+\frac{47}{8}$

$p=-\frac{1}{8}$

Use the information provided to write the standard form equation of each ellipse.

C(-2,4)
a=11
b=8

12) Vertices: $(9, 4)$, $(-13, 4)$
Co-vertices: $(-2, 12)$, $(-2, -4)$

(-13,4) (-2,12) (-2,4) (9,4) (-2,-4)

$\frac{(x+2)^2}{121}+\frac{(y-4)^2}{64}=1$

13) Foci: $(-8, -4+5\sqrt{3})$, $(-8, -4-5\sqrt{3})$
Co-vertices: $(3, -4)$, $(-19, -4)$

C(-8,-4)
b=11
$c=5\sqrt{3}$

$(5\sqrt{3})^2=a^2-121$

$25\cdot3=a^2-121$

$75=a^2-121$

$196=a^2$

$\frac{(x+8)^2}{121}+\frac{(y+4)^2}{196}=1$

$-8, -4+5\sqrt{3}$ F

CV CV

$-19,-4$ $(-5,-4)$ $(3,-4)$

F $-8, -4-5\sqrt{3}$

Use the information provided to write the standard form equation of each hyperbola.

14) Vertices: $(10, 11)$, $(10, -7)$
Foci: $(10, 2+\sqrt{202})$, $(10, 2-\sqrt{202})$

center $\left(10, \frac{11+-7}{2}\right)$

center $(10, 2)$

$a=9$

$c=\sqrt{202}$

$202=81+b^2$

$121=b^2$

(10,11) (10,2) (10,-7)

$10, 2+\sqrt{202}$

$10, 2-\sqrt{202}$

$\frac{(y-2)^2}{81}-\frac{(x-10)^2}{121}=1$

15) Vertices: $(2, 9)$, $(-8, 9)$
Perimeter of Central Rectangle = 44

$C\left(\frac{-8+2}{2}, 9\right)$

C(-3,9)
a=5
b=6

$\frac{(x+3)^2}{25}-\frac{(y-9)^2}{36}=1$

$12\overline{)44}$ -20 24 $\frac{24}{2}=12$

Identify the vertices, foci, and asymptotes of each.

C(-7,9)
a=14
b=7

16) $\frac{(x+7)^2}{196}-\frac{(y-9)^2}{49}=1$

$c=\sqrt{196+49}$

$c=\sqrt{245}=7\sqrt{5}$

(-21,9) -7,9 (7,9)

V(-21,9) (7,9)

$F(-7\pm7\sqrt{5}, 9)$

$y=\pm\frac{7}{14}(x+7)+9$

$y=\frac{1}{2}(x+7)+9$

$=\frac{1}{2}x+\frac{7}{2}+\frac{18}{2}$

$y=\frac{1}{2}x+\frac{25}{2}$

$y=-\frac{1}{2}(x+7)+9$

$=-\frac{1}{2}x-\frac{7}{2}+\frac{18}{2}$

$y=-\frac{1}{2}x+\frac{11}{2}$

Accel Geom

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SBM 2 Benchmark Review 2

Factor each and find all roots.

1) $x^4 + 9x^2 + 8 = 0$

$(x^2+1)(x^2+8)=0$

$x^2=-1$ $\quad x^2=-8$

$x=\pm\sqrt{-1}$ $\quad x=\pm\sqrt{8}$

$x=\pm i$ $\quad x=\pm 2i\sqrt{2}$

$\{\pm i, \pm 2i\sqrt{2}\}$

2) $x^4 - 2x^3 - 5x^2 + 10x = 0$

$x(x^3-2x^2-5x+10)=0$

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

$x(x^2-5)(x-2)=0$

$\{0, \pm\sqrt{5}, 2\}$

3) $x^3 - 6x^2 + 5x = 0$

$x(x^2-6x+5)=0$

$x(x-1)(x-5)=0$

$\{0, 1, 5\}$

4) $x^6 - 4x^4 - 25x^2 + 100 = 0$

$x^4(x^2-4)-25(x^2-4)$

$(x^4-25)(x^2-4)=0$

$(x^2+5)(x^2-5)(x+2)(x-2)=0$

$\{\pm i\sqrt{5}, \pm\sqrt{5}, \pm 2\}$

Write a polynomial function of least degree with integral coefficients that has the given zeros.

5) $-3,\ 2+\sqrt{7}$

$x=-3$

$x+3=0$

$x=2+\sqrt{7}$

$(x-2)^2=(\sqrt{7})^2$

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

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

	x^2	$-4x$	-3
x	x^3	$-4x^2$	$-3x$
3	$3x^2$	$-12x$	-9

$f(x)=x^3-x^2-15x-9$

6) $3-i,\ \sqrt{5}$

$x=3-i$

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

$x^2-6x+9=(-1)^2(i)^2$

$x^2-6x+9=(1)(-1)$

$x^2-6x+9=-1$

$x^2-6x+10=0$

$(x)^2=(\sqrt{5})^2$

$x^2=5$

$x^2-5=0$

	x^2	$-6x$	10
x^2	x^4	$-6x^3$	$10x^2$
-5	$-5x^2$	$30x$	-50

$f(x)=x^4-6x^3+5x^2+30x-50$

Describe the end behavior of each function.

7) $f(x)=x^3-3x^2-1$

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

$x\to\infty, f(x)\to\infty$

8) $f(x)=-x^4+3x^2-2x$

$\downarrow\ \downarrow$

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

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

Copy Copy square multiply square

Factor each completely. SOAP

9) $216x^3 - 1$

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

$(6x - 1)(36x^2 + 6x + 1)$

10) $2x^3 + 16$

$2(x^3 + 8)$

$2(x^3 + 2^3)$

$2(x + 2)(x^2 - 2x + 4)$

11) $256x^3 - 500$

$4(64x^3 - 125)$

$4((4x)^3 - (5)^3)$

$4(4x - 5)(16x^2 + 20x + 25)$

$4(4x-5)(16x^2+20x+25)$

12) $27x^3 + 8$

$(3x)^3 + 2^3$

$(3x + 2)(9x^2 - 6x + 4)$

State the possible rational zeros for each function. Then find all zeros.

13) $f(x) = 2x^3 - 7x^2 + 2x$ $p=2$ $\{1,2\}$ $q=2$ $\{1,2\}$

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

$\frac{p}{q} = 0, \pm\{1, \frac{1}{2}, 2\}$

$x = \frac{-(-7) \pm \sqrt{49 - 4(2)(2)}}{2(2)}$

$\frac{7 \pm \sqrt{49-16}}{4} = \left\{0, \frac{7 \pm \sqrt{33}}{4}\right\}$

14) $f(x) = 5x^3 + 13x^2 + 4x$

$f(x) = x(5x^2 + 13x + 4)$

$p = \{1, 2, 4\}$ $q = \{1, 5\}$

$\frac{p}{q} = 0, \pm\{1, \frac{1}{5}, 2, \frac{2}{5}, 4, \frac{4}{5}\}$

20 x 2

1 20

2 10

4 5

$x = \frac{-13 \pm \sqrt{169 - 4(5)(4)}}{2(5)}$

$\frac{-13 \pm \sqrt{89}}{10}$

$\left\{0, \frac{-13 \pm \sqrt{89}}{10}\right\}$

15) $f(x) = 3x^3 + 7x^2 + 4x + 4$

$p = 4$ $\{1, 2, 4\}$

$q = 3$ $\{1, 3\}$

$\frac{p}{q} = \pm\{1, \frac{1}{3}, 2, \frac{2}{3}, 4, \frac{4}{3}\}$

$-2 \mid 3 \;\; 7 \;\; 4 \;\; 4$

$\quad\quad -6 \;\; -2 \;\; -4$

$3 \;\; 1 \;\; 2 \;\; 0$

$\rightarrow 3x^2 + x + 2 = 0$

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

$x = \frac{-1 \pm \sqrt{-23}}{6}$

$\left\{-2, \frac{-1 \pm i\sqrt{23}}{6}\right\}$

16) $f(x) = 3x^3 - 7x^2 + 5x - 1$

$p = 1$

$q = 3$ $\{1, 3\}$

$\frac{p}{q} = \pm\{1, \frac{1}{3}\}$

$1 \mid 3 \;\; -7 \;\; 5 \;\; -1$

$\quad\quad 3 \;\; -4 \;\; 1$

$3 \;\; -4 \;\; 1 \;\; 0$

$\rightarrow 3x^2 - 4x + 1 = 0$

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

$3x(x-1) - 1(x-1) = 0$

$(3x-1)(x-1) = 0$

$x = \frac{1}{3}$ $x = 1$

$\{1$ mult of 2, $\frac{1}{3}\}$

Accelerated Geometry

Spring BM 2 Review 3

Name_____

Simplify. Write "undefined" for expressions that are undefined.

1) $\begin{bmatrix} 6 & -5 & 4 \\ -2 & 5 & 4 \end{bmatrix} \cdot \begin{bmatrix} 0 & 0 \\ -6 & -4 \end{bmatrix}$ 2x3 · 3x2

undefined

2) $\begin{bmatrix} 0 \\ -3 \\ 5 \\ -6 \end{bmatrix} + \begin{bmatrix} -4 \\ 4 \\ -2 \\ 0 \end{bmatrix} - \begin{bmatrix} 4 \\ -2 \\ 4 \\ -1 \end{bmatrix} = \begin{bmatrix} -4 \\ 1 \\ 3 \\ -6 \end{bmatrix} - \begin{bmatrix} 4 \\ -2 \\ 4 \\ -1 \end{bmatrix} = \begin{bmatrix} -8 \\ 3 \\ -1 \\ -5 \end{bmatrix}$

3) $\begin{bmatrix} 4 & -5 \\ -3 & 3 \end{bmatrix} \cdot \begin{bmatrix} 2 & -4 & -4 \\ 6 & -3 & 0 \end{bmatrix} - \begin{bmatrix} 3 & 5 & 0 \\ -2 & 2 & 1 \end{bmatrix}$ 2x2 · 2x3 → 2x3

$\begin{bmatrix} 8-30 & -16+15 & -16+0 \\ 6+18 & 12+-9 & 12+0 \end{bmatrix} = \begin{bmatrix} -22 & -1 & -16 \\ 12 & 3 & 12 \end{bmatrix} -$

$\begin{bmatrix} -25 & -6 & -16 \\ 14 & 1 & 11 \end{bmatrix}$

4) $\begin{bmatrix} 0 & -4 \\ -5 & -3 \\ -6 & -5 \end{bmatrix} \cdot \left(\begin{bmatrix} 6 & 2 \\ -6 & -2 \end{bmatrix} - \begin{bmatrix} -6 & -3 \\ -1 & -2 \end{bmatrix} \right)$ 3x2

$\begin{bmatrix} 0 & -4 \\ -5 & -3 \\ -6 & -5 \end{bmatrix} \cdot \begin{bmatrix} 12 & 5 \\ -5 & 0 \end{bmatrix}$ 3x2 · 2x2

$\begin{bmatrix} 20 & 0 \\ -60+15 & -25+0 \\ -72+25 & -30+0 \end{bmatrix} = \begin{bmatrix} 20 & 0 \\ -45 & -25 \\ -47 & -30 \end{bmatrix}$

Evaluate each determinant.

5) $\begin{vmatrix} -3 & 0 & -4 \\ -5 & -1 & -3 \\ -5 & -4 & 0 \end{vmatrix}$

$(0+0+-80) - (-20+-36+0)$

$-80 - (-56)$

-24

-56

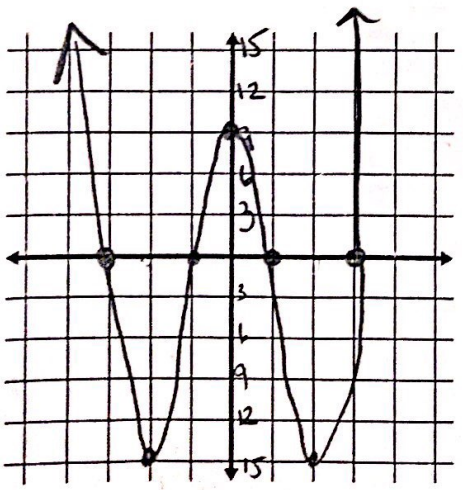
21

6) $\begin{vmatrix} -5 & 2 \\ 2 & -3 \end{vmatrix}$

$15-4 = 11$

GRAPH EACH POLYNOMIAL FUNCTION and list all of the characteristics.

7) $f(x) = x^4 - 10x^2 + 9$; $Roots = \pm 3, \pm 1$



Local Minimum: $(-2,-15)$ $(2,-15)$

Local Maximum: $(0,9)$

Y-Intercept: $(0,9)$

End Behavior: $x \to -\infty,\ f(x) \to \infty$; $x \to \infty,\ f(x) \to \infty$

Domain: $\mathbb{R}$ Range: $y \geq -15$

Increase: $(-2,0) \cup (2,\infty)$

Decrease: $(-\infty,-2) \cup (0,2)$

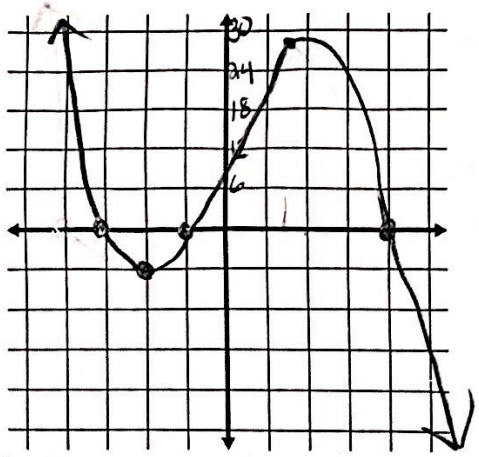
$f(0) = 9$

$f(-2) = -15$

$f(2) = -15$

y's by 6

8) $f(x) = -x^3 + 13x + 12; Roots = -1, 4, -3$



$\frac{-1+-3}{2}$ $\frac{-1+4}{2}$

$\frac{-4}{2}$ $\frac{3}{2}$

$f(-2) = -6$

$f(1.5) = 28.13$

Local Minimum: $(-2, -6)$

Local Maximum: $(1.5, 28.13)$

Y-Intercept: $(0, 12)$

End Behavior: $x \to -\infty, f(x) \to \infty$ $x \to \infty, f(x) \to -\infty$

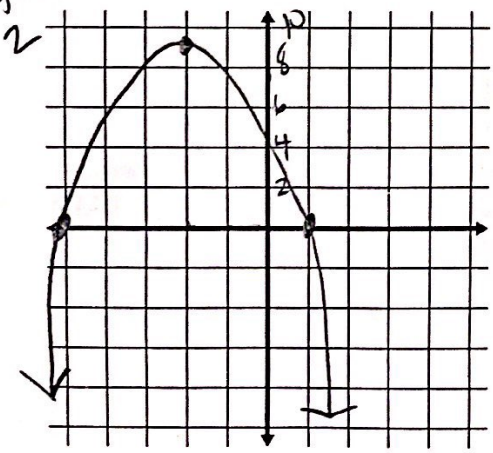
Domain: $\mathbb{R}$ Range: $\mathbb{R}$

Increase: $(-2, 1.5)$

Decrease: $(-\infty, -2) \cup (1.5, \infty)$

y's by 2

9) $f(x) = -x^2 - 4x + 5$; $Roots = -5, 1$



$\frac{-5+1}{2}$ $f(-2) = 9$

$\frac{-4}{2}$

-2

Local Minimum: none

Local Maximum: $(-2, 9)$

Y-Intercept: $(0, 5)$

End Behavior: $x \to -\infty, f(x) \to -\infty$ $x \to \infty, f(x) \to -\infty$

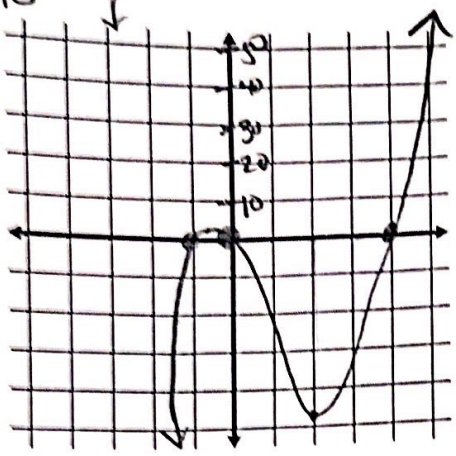
Domain: $\mathbb{R}$ Range: $y \leq 9$

Increase: $(-\infty, -2)$

Decrease: $(-2, \infty)$

10) $f(x) = x^5 - 3x^4 - 4x^3$; *Roots* = 0 *mult. of* 3, −1, 4

y's by 10



Local Minimum: (2, -48)

Local Maximum: (-0.5, 0.28)

Y-Intercept: (0, 0)

End Behavior: $x \to -\infty, f(x) \to -\infty$; $x \to \infty, f(x) \to \infty$

Domain: $\mathbb{R}$ Range: $\mathbb{R}$

Increase: $(-\infty, -0.5) \cup (2, \infty)$

Decrease: $(-0.5, 2)$

$f(-0.5) = 0.28$

$f(2) = -48$

$$P(r) = {}_nC_r\, p^r\, q^{n-r}$$

11) A coin is flipped 11 times. What is the probability of getting at least 9 heads?

$n = 11$

$r = 9, 10, 11$

$p = 0.5$

$q = 0.5$

$P(9) + P(10) + P(11)$

${}_{11}C_9 (0.5)^9 (0.5)^2 + {}_{11}C_{10} (0.5)^{10} (0.5)^1 + {}_{11}C_{11} (0.5)^{11} (0.5)^0$

0.0327148544

12) You just took your science benchmark. Each question had 5 answer choices. What is the probability you got exactly 15 of the 20 questions correct?

$n = 20$

$r = 15$

$p = .20$

$q = .80$

${}_{20}C_{15} (.20)^{15} (.80)^5$

0.0000000166

13) Everyone in your math class of 8 students has taken the driving test. The average passing rate is 81%. What is the probability that more than 1 classmates passed the test?

$n = 8$

$r = 2, 3, 4, 5, 6, 7, 8$

$p = .81$

$q = 0.19$

$P(>1) = 1 - (P(0) + P(1))$

$= 1 - ({}_8C_0 (.81)^0 (.19)^8 + {}_8C_1 (.81)^1 (.19)^7)$

$= 0.9999940379$