PreCalculus
Review for Midterm Exam

Name _____

In order to receive bonus points, this worksheet must be completed on **SEPARATE** paper. You must show **ALL** of your **WORK** and have it **ORGANIZED** neatly. This must be turned in on the day of your midterm exam.

Conics

1. Graph and provide the requested information:
    Circles: Center, Radius
    Ellipses: Center, Vertices, Co-vertices, foci, major and minor axis length
    Hyperbolas: Center, Vertices, Foci, and Asymptotes
    Parabolas: Vertex, Focus, Directrix, End Points of Latus Rectum

a. $(x+1)^2 + (y-3)^2 = 10$

b. $\dfrac{(x-2)^2}{9} + \dfrac{y^2}{25} = 1$

c. $16x^2 - 9y^2 = 144$

d. $\dfrac{(y-2)^2}{25} - \dfrac{(x+3)^2}{4} = 1$

e. $(x+4) + (y-2)^2 = 0$

f. $4(y-1)^2 = 16(x-5)$

2. Name the conic and write it in standard form:

a. $x^2 + y^2 - 6x - 2y + 1 = 0$

b. $6x^2 - 12 = 6y^2$

c. $9x^2 + 4y^2 + 54x - 16y + 61 = 0$

d. $9x^2 - 4y^2 + 36x - 8y - 40 = 0$

e. $x^2 + x - y = 5$

3. Write the standard form of the given conic using the given information:

a. circle with center (–2, 3) and diameter 8

b. horizontal ellipse with center at (3, –4); major axis length 8; minor axis length 4

c. circle with center (1, 4) and passes through (2, –1)

d. hyperbola with vertices (1, 2) and (5, 2) and the slope of one asymptote is $\dfrac{3}{2}$

e. ellipse with vertices at (2, 1) and (6, 1); co-vertices at (4, 2) and (4, 0)

f. hyperbola with vertices $(0, \pm 2)$ and foci $(0, \pm 4)$

g. parabola with focus (5, 5), directrix: $y = -3$

h. parabola with vertex (2, -1), passes through (4, 2), $p > 0$, axis of symmetry: $x = 2$

4. Solve the systems of equations by graphing.

a. $x^2 + y^2 = 16$
  $x - y = 4$

b. $(x + 1)^2 + (y - 3)^2 = 1$
  $x^2 + y^2 - 4x - 5 = 0$

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

5. Solve the systems algebraically.

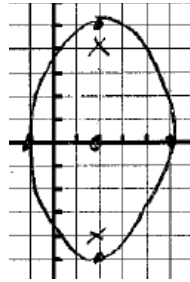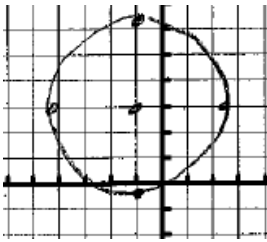a. $x^2 + y^2 = 5$
  $y = -x + 3$

b. $x^2 + y^2 = 9$
  $x^2 + y^2 - 4x + 3 = 0$

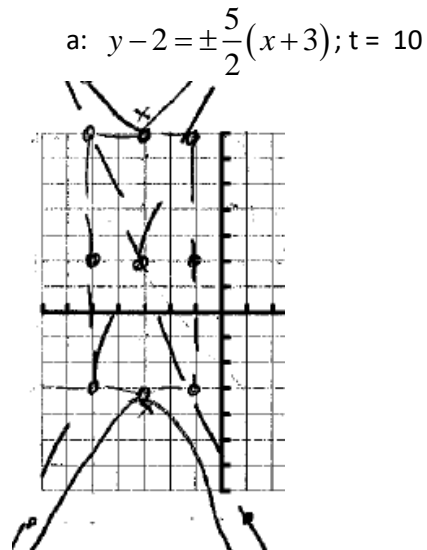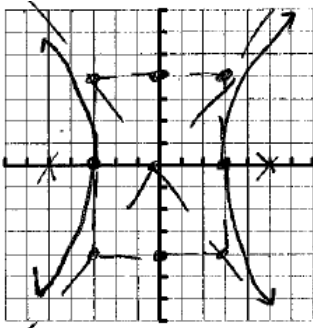c. $4x^2 + 9y^2 - 36y = 0$
  $x^2 + 9y - 27 = 0$

Answers

1a) c = (-1,3); r = $\sqrt{10} \approx 3.16$

1b) c = (2,0); v = (2,5), (2,-5); cv = (-1,0), (5,0); f = (2,4), (2,-4); ma = 10; mi = 6

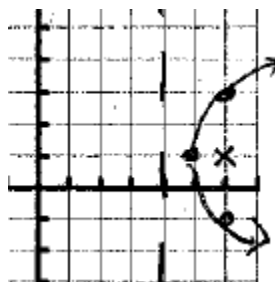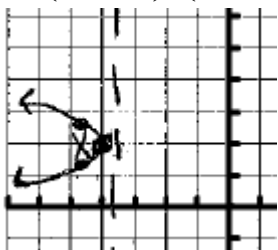1c) c = (0,0); v = (-3,0), (3,0); f = (-5,0), (5,0); a = $y = \pm\dfrac{4}{3}x$

1d) c = (-3,2); v = (-3,-3), (-3,7); f = $\left(-3, 2 \pm \sqrt{29}\right)$

a: $y - 2 = \pm\dfrac{5}{2}(x+3)$; t = 10

1e) v = (-4,2); f = $\left(-\dfrac{17}{4}, 2\right)$; d = $x = -\dfrac{15}{4}$;

lr = $\left(-\dfrac{17}{4}, \dfrac{3}{2}\right), \left(-\dfrac{17}{4}, \dfrac{5}{2}\right)$

1f) v = (5,1); f = (6,1); d = x = 4; lr = (6,3), (6,-1)

2a) Circle; $(x-3)^2+(y-1)^2=9$ 2b) Hyperbola; $\dfrac{x^2}{2}-\dfrac{y^2}{2}=1$ 2c) Ellipse; $\dfrac{(x+3)^2}{4}+\dfrac{(y-2)^2}{9}=1$

2d) Hyperbola; $\dfrac{(x+2)^2}{8}-\dfrac{(y+1)^2}{18}=1$ 2e) Parabola; $\left(x+\dfrac{1}{2}\right)^2=y+\dfrac{21}{4}$

3a) $(x+2)^2+(y-3)^2=16$ 3b) $\dfrac{(x-3)^2}{16}+\dfrac{(y+4)^2}{4}=1$ 3c) $(x-1)^2+(y-4)^2=26$

3d) $\dfrac{(x-3)^2}{4}-\dfrac{(y-2)^2}{9}=1$ 3e) $\dfrac{(x-4)^2}{4}+(y-1)^2=1$ 3f) $\dfrac{y^2}{4}-\dfrac{x^2}{12}=1$
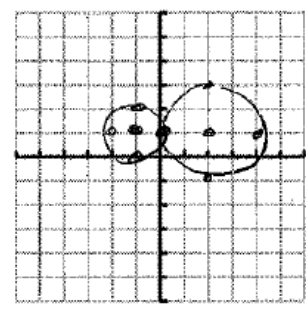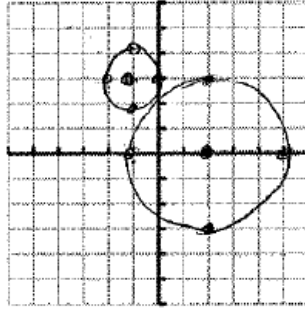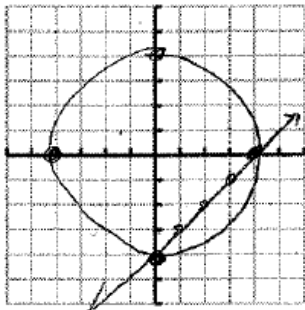
3g) $(x-5)^2=16(y-1)$ 3h) $(x-2)^2=\dfrac{4}{3}(y+1)$

4a) (0,-4), (4,0) 4b) No solution 4c) (0,1)

5a) (2,1), (1,2) 5b) (3,0) 5c) (3,2), (-3,2)