Honors Precalculus
Chapters 9 and 10 Exam
Fox

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Form B
Period 5

Free Response

Directions: Please show all relevant work in a clear and concise manner. Failure to show work may result in a loss of credit. Also …

1. each question will be graded out of 9 points
2. all answers are to be exact or rounded to three decimal places

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1. The *Acme* insurance company sells two savings plans, Plan A and Plan B.
   - For Plan A, an investor starts with an initial deposit of \$1000 and increases this by \$80 each month, so that in the second month, the deposit is \$1080, the next month it is \$1160 and so on.
   - For Plan B, the investor again starts with \$1000 and each month deposits 6% more than the previous month. recursive ?

   (a) Write down the amount of money invested under Plan B in the second and third months.

   *Give answers to parts (b) and (c) correct to the nearest dollar.*

   seq/series 3

   (b) Find the amount of the 12th payment for each Plan.

   (c) Find the total amount of money invested during the first 12 months.

   i) under Plan A
   ii) under Plan B

1 1/2

a) $a_2 = \sum_{i=1}^{2} 1000\left(\frac{1-0.6^i}{1-0.6}\right)$ = \$2060 after 2 months; $a_3 = \sum_{i=1}^{3} 1000\left(\frac{1-0.6^i}{1-0.6}\right)$ = \$3123.6 after 3 months

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b) Plan A: $a_{12} = 1000 + (11)80$ = \$1880 at month 12

Plan B: $a_{12} = a_{12-1} + 0.06i$ = \$2012 at month 12

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c) i) $\frac{12}{2}(1000 + 1880)$ = \$17280 total after 12 months

ii) $\sum_{i=1}^{12} 1000\left(\frac{1-0.6^i}{1-0.6}\right)$ = \$12698 total after 12 months

1 1/2

2. Given the following conics, determine all of the pertinent information and provide a complete sketch.

$$9x^2 - y^2 - 36x - 2y + E = 0$$

Conics 2

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(A) Let $E = 44$

$9(x^2 - 4x + \quad) - (y^2 + 2y \quad) = -44$

$9(x^2 - 4x + 4) - (y^2 + 2y + 1) = -44 + 36 - 1$

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

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

Hyperbola!

Center: $(2, -1)$

vert: $(2, -1 \pm 3)$

foci: $(2, -1 \pm \sqrt{10})$

asymptotes: $y \pm -2 = \pm 3(x-2)$

$e = \frac{c}{a} = \frac{\sqrt{10}}{3}$

Center $(2, -1)$

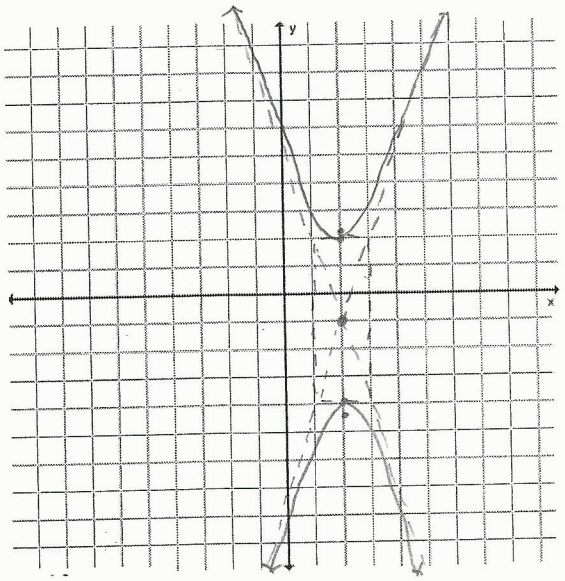
Vertices $(2, -4), (2, 2)$

Foci $(2, -1 \pm \sqrt{10})$

Asymptotes $y = -3x + 5$, $y = 3x - 7$

Eccentricity $\frac{\sqrt{10}}{3} \approx 1.054$

6/6




(B) $E = 35$

$9(x^2 - 4x \quad) - (y^2 + 2y \quad) = -35$

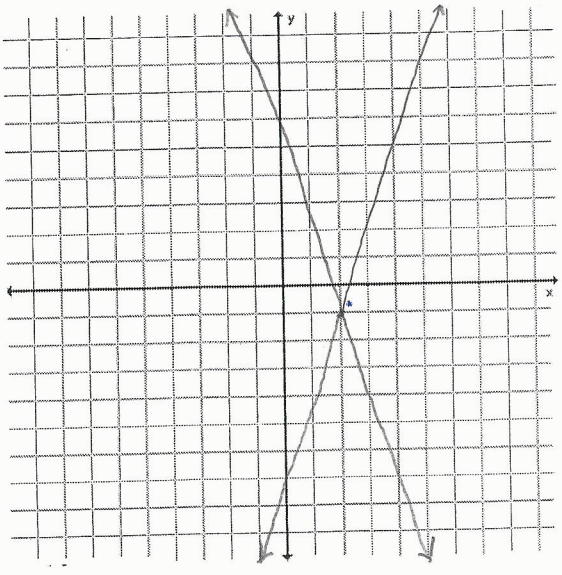
$9(x-2)^2 - (y+1)^2 = -35 + 36 - 1$

$9(x-2)^2 - (y+1)^2 = 0$ degenerative!

$$\frac{(x-2)^2}{1} - \frac{(y+1)^2}{9} = 0$$

2 intersecting lines, $y = -2 \pm 3(x-2)$

2/3



$$x = (v_0 \cos\theta)t$$

$$y = \frac{1}{2}gt^2 + (v_0 \sin\theta)t + y_0$$

parametric applications (1)

3. The center field wall of Dodger Stadium is 8 feet high and 395 feet from home plate. A baseball is hit 3 feet above the ground. It leaves the bat at an angle of 43° with the horizontal at a speed of 108 feet per second. [Please neglect altitude, air temp, ball temp, barometric pressure, wind, humidity, pitch speed, composition of bat, etc.] Let $g = -32 \frac{\text{ft/sec}}{\text{sec}}$.

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   a. Write the two parametric equations that simulate the path of the baseball.
   b. What is the maximum height that the ball attains?
   c. At what time does the ball attain its maximum height?
   d. Determine if the baseball will clear the center field wall by 1 foot?
   e. If the ball does *not* clear the center field wall, how far forward would the wall have had to be moved for the ball to clear it by 1 foot?

a) $x = (108\cos(43°))t$ +1

$y = \frac{1}{2}\cdot(-32)\cdot t^2 + (108\sin(43°)) + 3$ +1

$t = \frac{x}{108\cos(\theta)}$

$y = \frac{1}{2}(-32)\left(\frac{x}{108\cos 43}\right)^2 + 108\sin 43\left(\frac{x}{108\cos 43}\right) + 3$

b) 123 feet -2

c) 162 feet -2

d) no, it didn't +1 -1

e) 62 feet -1