Review for Final Exam 2nd Semester **Name_____**

1. When something is first manufactured, the cost of making the item is relatively high. As the manufacturer gains experience, the cost per item decreases. Suppose that a shoe manufacturer finds the costs per pair of shoes shown in the table.

Pairs of shoes produced	$/pair
100	60
200	45
400	34
800	25

a) What pattern does the table of data follow? What type of function has this pattern?

b) Write the particular equation algebraically by using the first two points in the table.

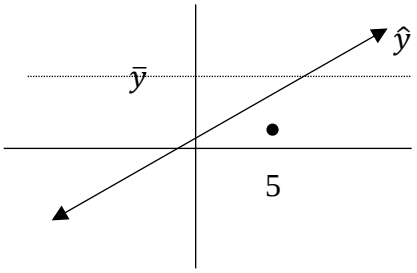
c) Use the appropriate kind of regression in your calculator (enter table in L1 and L2) and write the $\hat{y}$ equation and correlation coefficient, r.

d) Does this equation fit the data well? Explain.

e) Why is r negative?

f) Use $\hat{y}$ to predict how much it cost to manufacture 1000 pairs of shoes.

2. Draw and label the residual at the point where x = 5 and draw and label the deviation at x = 5.



3. Panera offers 15 types of bagels and 6 flavors of cream cheese. How many different ways can you select 1 bagel and 1 cream cheese?

4. Given X and Y are independent events and P(X) = 0.4 and P(Y) = 0.3

a) find P(X and Y)

b) find P(X or Y)

5. If the probability of taking a test on a particular day is 30%:

a) what is the probability of no test on that day?

b) what is the probability that you take a test on all three days?

c) what is the probability that you take a test on exactly two of the three days?

6. How many ways can you order 4 books on a shelf?

7. a) There are 24 different kinds of donuts at a donut shop. If you want to make boxes of 12 donuts, how many different boxes could be made?

b) If the order the donuts selected is important, how many boxes of 12 donuts could be made?

8. The table shows the probabilities and payoffs for the 3 possible outcomes of a random experiment. Find the *mathematical expectation*. What does it mean that the expectation is negative?

Event	Probability	Payoff
1	0.04	$100
2	0.06	$4
3	0.9	-$5

9. Cedric has a 70% probability of being late to Pre-Calculus on any day of the 5 school days. What is the probability he will be late exactly 3 of the 5 days?

10. Suppose there is a 30% probability of snow on Thursday and a 40% probability of snow on Friday. Find the probability that it snows:

a) Both days

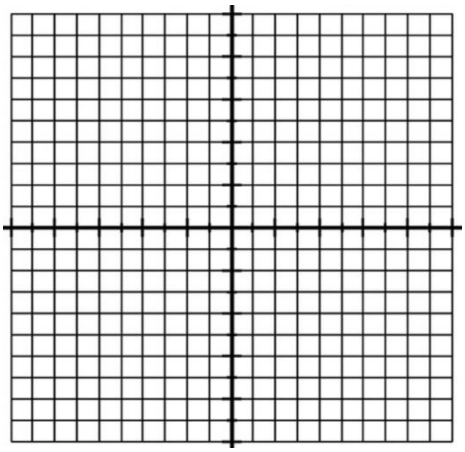
b) either Thursday or Friday

c) Thursday, but not Friday

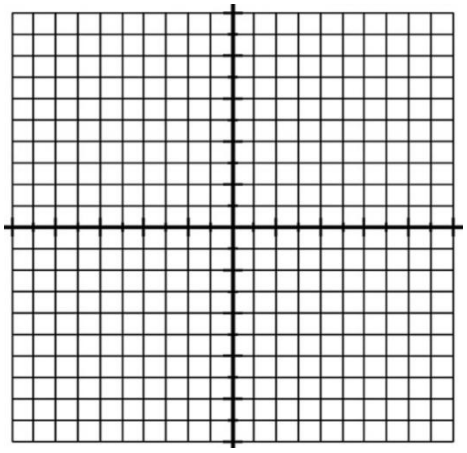
d) Neither day

A) Graph. Label foci, vertices, asymptotes.
B) Then write parametric equations for each problem.
C) Find eccentricity, *e*.

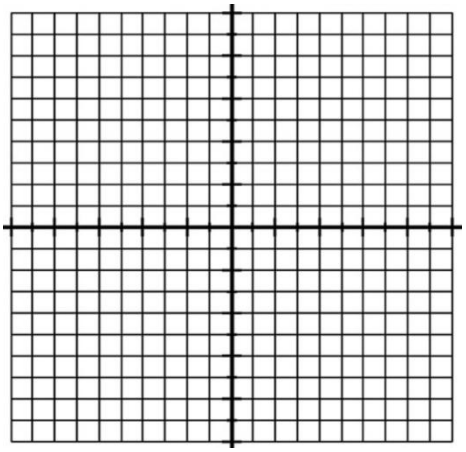
11. $\frac{(x-2)^2}{9}+\frac{(y+1)^2}{25}=1$



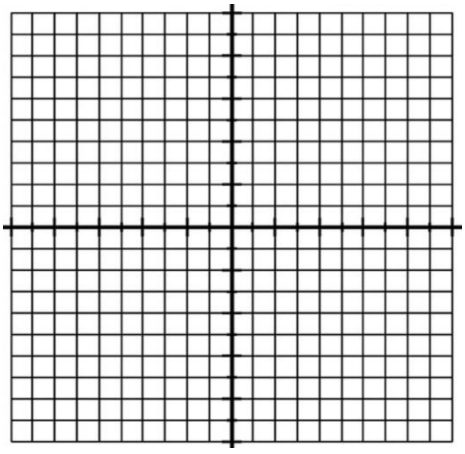
12. $\frac{x^2}{4}-\frac{(y-3)^2}{25}=1$



13. $(x-2)^2+y+3=0$



14. $\frac{(x-4)^2}{9}+\frac{(y+5)^2}{9}=1$



Write the Cartesian equation satisfying the given conditions.

15. **ellipse** endpoints of major axis (3, 5) and (3, -9)
foci $(3, -2 + \sqrt{45})$ and $(3, -2 - \sqrt{45})$

16. **parabola** vertex (1, 8) focus $(1, 7\frac{1}{4})$

Without graphing, tell whether the graph would be a circle, an ellipse, hyperbola, or parabola.

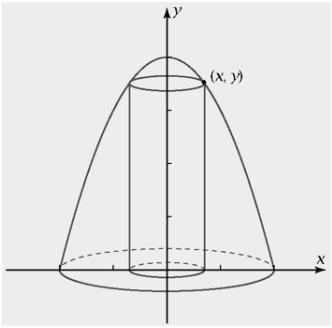
17. $5x^2 + 5y^2 = 125$

18. $x^2 - y^2 = 1$

19. $5(x-2)^2 + 5y = 11$

20. $2x^2 + 5y^2 = 100$

21. The figure shows the paraboloid formed by rotating the graph of $y = 4 - x^2$ about the *y*-axis. A cylinder is inscribed in the paraboloid, with its axis along the *y*-axis. The bottom base of the cylinder is at the origin, and the top base touches the inside of the paraboloid. Find the value of x that maximizes the volume of the cylinder. $\boldsymbol{V = \pi r^2 h}$



x = _____

Max volume = _____

Height of cylinder = _____

Plot the polar coordinates. Then give 2 other names for the same point.

22. $(4, 150°)$

23. $(-3, 60°)$

Evaluate and simplify the expressions.

24. $(2 - 3i)(4 + 5i)$

25. $(3 + 4i) - (6 - 2i)$

26. $(8cis32°)(2cis84°)$

27. $(2cis80°)(4cis120°)$

28. $\frac{20\text{cis}100°}{5\text{cis}20°}$

29. $\frac{25\text{cis}60°}{25\text{cis}15°}$

30. $(3cis50°)^4$

31. $(2cis10°)^3$

32. $\sqrt[4]{81cis100°}$

33. $\sqrt[3]{27cis120°}$

34. Write the complex number $5 - 12i$ in polar form.

35. a) What kind of sequence is this? 27, 31, 35, …

b) Write the next two terms.

c) Write a formula for t_n

d) Find t_{100}

e) Find S_{20}

f) Find n if $t_n = 783$

g) Find n if $S_n = 22{,}500$

36. a) What kind of series is this? 80 + 48 + 28.8 + …

b) Write the next two terms.

c) Write a formula for t_n

d) Find t_8

e) Find S_{20}

f) Find n if $t_n = 0.0048748779$

g) Find the limit S_n approaches as n goes to infinity.

37. A diver was standing on a diving board and dove into the pool modeled by the function $(x) = -16x^2 + 15x + 8$.

a) Graph the function in an appropriate window and draw it here.

b) Find derivative of f(x)

c) What is the diver's speed at x = 1 second?

d) Find the equation of the line tangent to the graph at x = 1.

e) Find the extreme point(s) of f(x) using the derivative.

38. Let $g(x) = x^3 - 9x^2 + 2x - 5$ Use synthetic substitution to evaluate x = 3.

39. a) Simplify and then sketch the graph of $y = \frac{(x-3)(x-2)}{x-3}$

b) What kind of discontinuity does the graph have at x = 3?