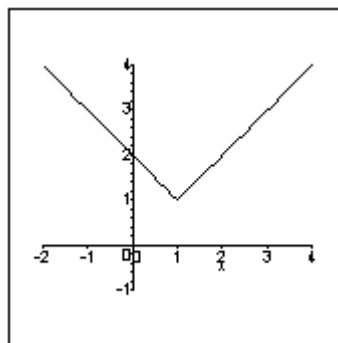
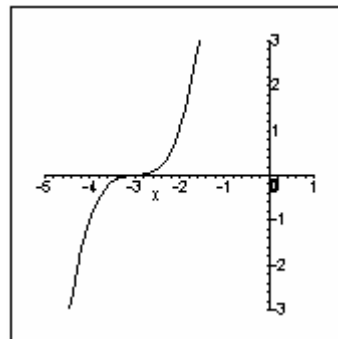
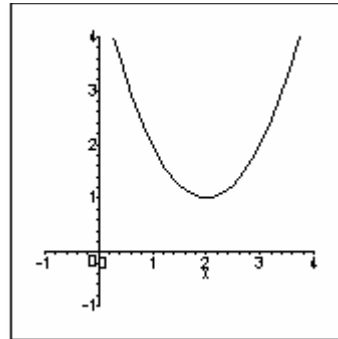


General test instructions: Show all your work on this test paper! If you solve a problem algebraically show all your steps. If you solve a problem by graphing on your calculator, show a sketch of the graph, with the solution labeled. **Where appropriate, round answers to 3 decimal places.**

1. Solve: $x^2 - 7x + 6 = 3x - 16$
2. Solve: $x - 3 = 4\sqrt{x + 2}$
3. Solve this system of equations.
 $6x + 12y = 2$
 $3x - 5y = -10$
4. Solve this system of equations.
 $y = x^2 - 12x + 18$
 $2x - y = 6$
5. For a lab project, a student needs 100 cubic centimeters of a solution that is 9% HCl. The lab has only solutions that are 12% and 4% HCl. How many cubic centimeters of each available solution should be mixed to get 100 cubic centimeters of 9% HCl?
6. Solve: $|2x + 7| \leq 15$
7. Solve: $3x^2 + 13x > 10$
8. Evaluate:
 - a. $3^{\log_3 52} =$
 - b. $\log_5 13 =$
9. Solve: $7e^{3x} - 5 = 23$
10. Solve: $\log(x) + \log(x + 3) = 1$
11. A culture of bacteria obeys the exponential law. If 700 bacteria are present initially and there are 900 bacteria after two hours, how many will be present in 5 hours?



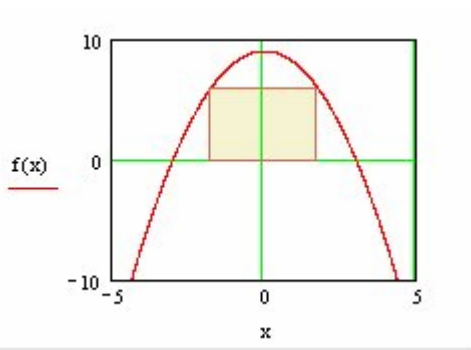
12. Write the equation for each of the functions graphed below. Each one is a translation of one of the functions: $f(x) = |x|$, $f(x) = x^2$, or $f(x) = x^3$

13. Graph $f(x) = x^2(x + 4)(x - 2)$. Determine the local maxima and minima on the interval $(-5, 3)$. Round to two decimal places.

14. List all real zeros (including the multiplicity for each) for the following polynomials:

- a. $f(x) = 5(x - 3)^2(x + 6)$
- b. $f(x) = (x^2 - 4)(x^2 + 9)$

15. A rectangle is inscribed in the region bounded by the parabola $y = 9 - x^2$ and the x-axis, as shown:



- Express the area, A , as a function of x .
- For what value of x is A largest?

16. Analyze the function $f(x) = \frac{x^2 - 4}{x^2 - 3x - 4}$

- y-intercept
- x-intercepts
- vertical asymptotes
- horizontal asymptote
- graph $y = f(x)$; include x and y-intercepts and all asymptotes.

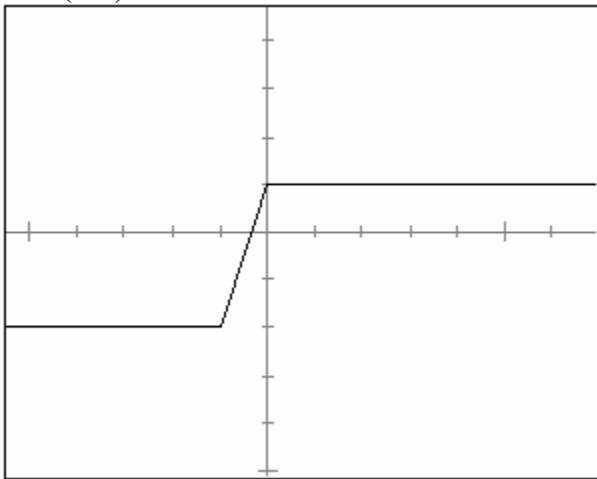
17. Simplify, write in the standard $a + bi$ form.

$$(3 - 2i)(4 + i)$$

18. Find **all zeros** (real and complex) of the polynomial function

$$f(x) = x(x^2 - 6x + 10)$$

19. If the graph below is $y = f(x)$, sketch the graph of $f(x-2)+1$ on the same set of axes.



20. Given the function $g(x) = 2 + \sqrt{x}$, what is its
- domain?
 - range?
 - What is its inverse function?
 - Graph $g(x)$ and $g^{-1}(x)$

21. Given

$$f(x) = \sqrt{5-x} \text{ and } g(x) = x^2 - 9 \text{ find:}$$

- $f(-11)$
 - $(f - g)(-4)$
 - $(g \circ f)(x)$.
22. Find an equation of the line that passes through the point $(-4, 3)$ and is parallel to the line $-6x - 3y = 15$.
23. The following data represent the population of a colony of bacteria during a 7 day period.

Time (days)	Population
0	30
1	60
2	105
3	190
4	350
5	650
6	1180

- Using a graphing utility, draw a scatter diagram.
- Find the line of best fit to the data. Write the linear function here:
- Fit an exponential curve to the data. Write the exponential function here:
- On the same axes as your scatter-plot in part a, graph the best fit line and the best fit exponential curve. Which of the two models fits the data better?
- Using the model you chose in part (d), estimate the population of the colony at $6 \frac{1}{2}$ days.