

1. (2 points each) True or False - Circle your answer.

- (a) T F $x = 2$ is a linear function.
- (b) T F The logarithmic form of $5^2 = 25$ is $\log_5 25 = 2$.
- (c) T F For any function, $f(x)$, if $f(0)$ is undefined, then $f(x)$ does not have a y -intercept.
- (d) T F An equilibrium point can be found by setting revenue equal to cost.
- (e) T F Given $a \neq 3$, the slope of the line passing through the points $(2a, 12)$ and $(a + 3, 4a)$ is -4 .

(5 points)

2. How is the graph of $g(x) = -2e^{(x+3)} - 5$ related to a basic function learned in this class? Below, give the basic function you would start with, and then list, in order, the transformations you would use to obtain the graph of $g(x)$.

BASIC FUNCTION: _____

TRANSFORMATIONS:

(5 points)

3. Kathryn invests \$8500 into an account paying 5.75% annual interest, compounded weekly. How long (rounded to 2 decimal places) will it take her account to accumulate to \$25000, assuming she makes no additional deposits or withdrawals?

(5 points)

4. State the domain of $g(x) = \frac{\sqrt{10 - 2x} + e^{-x}}{x^2 - 36}$ using interval notation.

(8 points)

5. Given $f(x) = \sqrt{x-4}$, find $\frac{f(x+h) - f(x)}{h}$ and **simplify completely**.

(10 points)

6. Given $f(x) = \frac{2(x-3)(x+4)}{(x-2)(4x-12)} = \frac{2x^2 + 2x - 24}{4x^2 - 20x + 24}$, find

(a) the domain.

(b) all vertical asymptotes.

(c) all horizontal asymptotes.

(d) the x -values of any “holes”.

(e) x -intercept(s)

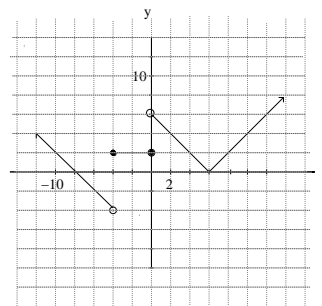
(6 points)

7. Evaluate each of the following:

(a) $\lim_{x \rightarrow \infty} \frac{4x^2 - 5x + 6}{2x + 10 - 3x^2}$

(b) $\lim_{x \rightarrow 9} \frac{\sqrt{x} - 3}{x - 9}$

(c) $\lim_{x \rightarrow -4^-} f(x)$ in the graph to the right.



(8 points)

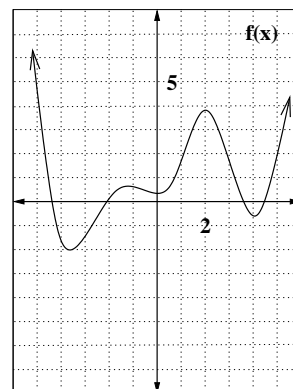
8. A company selling video games has a price-demand equation of $p = -0.50x + 80$, where x measures the number of video games sold and p is given in dollars. They have determined that it costs them a total of \$2900 to produce 60 games, with fixed costs of \$500.

- (a) Find the revenue function for the company.
- (b) State the domain of the revenue function using interval notation.
- (c) What is the maximum revenue the company can expect to receive from selling the video games?
- (d) Write the profit function, $P(x)$, for the company, in simplified form.

(3 points)

9. Use the given graph of $f(x)$ below to answer the following questions.

- (a) Is this an **EVEN** or **ODD** degree polynomial function? (Circle one.)
- (b) Is the leading coefficient **POSITIVE** or **NEGATIVE**? (Circle one.)
- (c) Give the range of $f(x)$. _____



(10 points)

10. Solve for x EXACTLY.

(a) $16 = \frac{4^x}{64^{(2x-1)}}$

(b) $\log_6(x + 4) + \log_6(x + 3) = 1$

(8 points)

11. The jigsaw puzzle habits of a particular group of people during one sitting are studied and the following is found. During the first 30 minutes of working on a puzzle, each person fits an average of 4 puzzle pieces per minute into the puzzle. If they continue to work on the puzzle after 30 minutes, each person only places an average of 2 puzzle pieces per minute into the puzzle. It is seen that the people sit no longer than 3 hours at one time when working on a puzzle. **Define x as the number of minutes** spent working on a puzzle at one sitting. **Write a piece-wise defined function, $f(x)$,** that represents the average number of pieces placed into a puzzle by a particular person in this group in one sitting. Simplify all expressions, eliminating parenthesis where possible.

(6 points)

12. Circle all of the functions below that are one-to-one.

$$f(x) = 5x^2 + 200$$

$$h(x) = 5 * 2^{-x}$$

$$m(x) = 4(x - 8)^3$$

(10 points)

13. The following chart shows the approximate average retail price of a gallon of regular gasoline (in dollars per gallon) in Centerville.

Year	1982	1984	1987	1990	1994	1999	2003	2006	2008	2009
Price	3.33	3.57	3.65	3.14	2.80	2.40	2.05	2.35	2.65	2.90

- (a) Let x represent the number of years since 1980. Which model (QUADRATIC, CUBIC, or QUARTIC) best explains this data, for extrapolation purposes? Once you have decided, write the equation of your model, rounding each coefficient to four decimal places (if necessary), and **explain why** this is your choice.

- (b) Using the model chosen in (a), predict the average price for a gallon of regular gasoline in Centerville in 1975 and 2012 (rounded to the nearest cent).

(6 points)

14. Find the x -values for any points of discontinuity for the function $f(x) = \begin{cases} \frac{x^2 + 4x - 5}{x^2 - 1} & , x < 1 \\ \frac{x^2 + 6x - 16}{x^2 + 2x - 8} & , x \geq 1 \end{cases}$

Explain **WHY** each point is not continuous for that value of x .

(a) at $x =$

(b) at $x =$

(c) at $x =$

	possible	earned
pg 1	25	
pg 2	24	
pg 3	11	
pg 4	24	
pg 5	16	
TOTALS	100	

Grade

Extra space for ungraded work.