

Name: _____

VIP ID: _____

- Write your name and VIP ID in the space provided above.
 - The test has seven (7) pages, including this one.
 - Each question is worth 5 points.
 - No books, or notes may be used on this test.
 - An approved calculator may be used on this test.
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Problem 1 (5 pts). The following table gives the sales of the medicinal herb *saw palmetto*, in millions of dollars, for several different years:

Year	1997	1998	1999	2000	2001
Sales (million dollars)	85	107	116	122	123

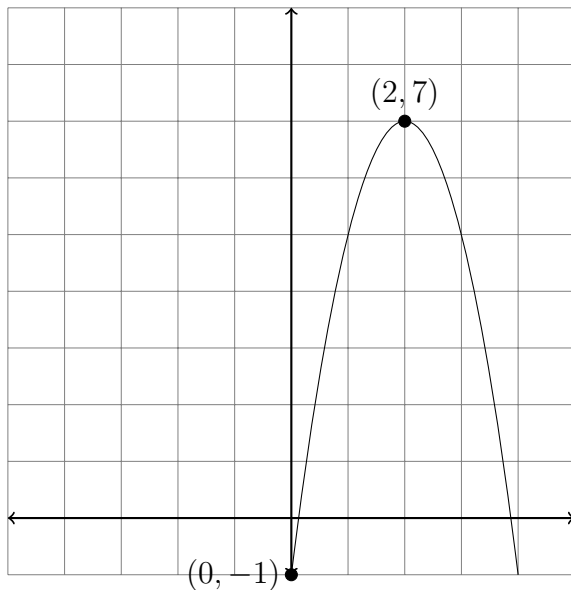
The average rate of change of sales over the period 1998 to 2000 is:

- ☐ 3.5 million dollars/year
 - ☐ 3.5 million dollars
 - ☐ 7.5 million dollars/year
 - ☐ 7.5 million dollars
 - ☐ 9.5 million dollars/year
 - ☐ 9.5 million dollars
 - ☐ 15 million dollars/year
 - ☐ 15 million dollars
-

Problem 2 (5 pts). Find the domain of the function $f(x) = \frac{5x + 3}{4x - 1}$

Problem 3 (5 pts). A car rental company offers two plans for renting a car. The first plan charges \$32 per day and 16 cents per mile. The second plan charges \$50 per day with free unlimited mileage. How many miles are needed for the second plan to save us money?

Problem 4 (5 pts). Write an equation for the quadratic equation graphed:



☐ $y = (x - 2)^2 - 3$

☐ $y = (x + 1)^2 + 2$

☐ $y = -2(x - 2)^2 + 7$

☐ $y = -3(x + 1)^2 + 2$

Problem 5 (5 pts). The cost in dollars to produce q tons of an item is given by the function $C = 100 + 20q$. What are the units of the 20?

☐ Dollars

☐ Tons

☐ Dollars/Tons

☐ Tons/Dollars

Problem 6 (5 pts). It costs a total of C dollars to extract T tons of ore from a copper mine. If C is a linear function of T , the units of the slope of the line are:

☐ Tons

☐ Dollars

☐ Tons/dollar

☐ Dollars/ton

Problem 7 (5 pts). Find the equation of a line that passes through (2, 4) and (4, 10).

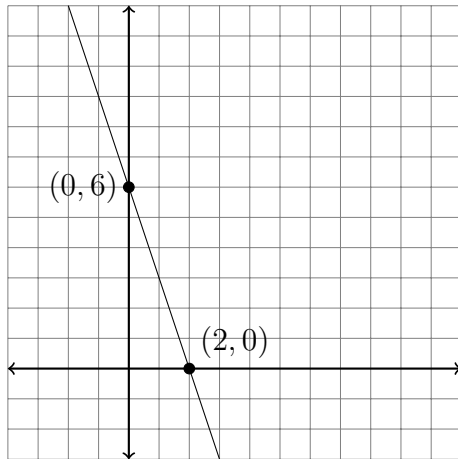
☐ $y = 4 + 3(x - 2)$

☐ $y = 8 - \frac{1}{3}(x - 8)$

☐ $y + 3 = -\frac{3}{2}x$

☐ $y = 4 + \frac{4}{5}x$

Problem 8 (5 pts). The graph below is a representation of which of the following functions?



☐ $y = -3x + 2$

☐ $y = 6x - 2$

☐ $y = 6x + 6$

☐ $y = -3x + 6$

Problem 9 (5 pts). When a person goes into shock, the cardiac output, in liters of blood per minute, decreases. One person's cardiac output is 12 liters per minute when the person first goes into shock, and decreases by 2 liters per minute every hour that the person is in shock. Write a formula for cardiac output C as a function of t , the time in hours since a person first went into shock.

☐ $C = 12 - 2t$

☐ $t = 12 - 2C$

☐ $C = -2 + 12t$

☐ $t = -2 + 12t$

☐ $C = 12 + 2t$

☐ $t = 12 + 2C$

Problem 10 (5 pts). Solve the following inequality:

$$(x - 5)(x + 1)^2 > 0$$

Problem 11 (5 pts). The concentration of a pollutant in a lake was 85 parts per million (ppm) in the year 2017 and is increasing at a rate of 4.6% each year. When will the concentration of pollutant reach 100 ppm?

Problem 12 (5 pts). Indicate whether the following are power functions. In case they are, find a suitable constant of proportionality C , and power r so you could write those functions in the form $f(x) = Cx^r$.

$f(x)$	Is it a power function?	C	r
$5\sqrt{x}$			
17^x			
$(3x^5)^2$			
$\frac{5}{2\sqrt{x}}$			
π			

Problem 13 (5 pts). Evaluate $f(-2)$ for $f(x) = 4 - \sqrt[3]{x-2}$.

Problem 14 (5 pts). Solve $f(x) = 4$ for $f(x) = 4 - \sqrt[3]{x-2}$.

Problem 15 (5 pts). Evaluate $f(7)$ for the function f given as a table below.

x	0	1	2	3	4	5	6	7	8	9
$f(x)$	62	8	7	38	86	73	70	39	75	34

Problem 16 (5 pts). Solve $f(x) = 7$ for the function f given as a table below.

x	0	1	2	3	4	5	6	7	8	9
$f(x)$	62	8	7	38	86	73	70	39	75	34

Problem 17 (5 pts). Solve for t in the equation $200 = 30e^{0.15t}$

Problem 18 (5 pts). Solve for x in the equation $4^{2x-3} = 44$

Problem 19 (5 pts). Sales at a company are changing according to the formula $S = 1000(0.82)^t$, where S is sales in thousands of dollars and t is measured in years. Sales at this company are:

- ☐ Increasing by 82% per year
 - ☐ Increasing by 82 thousand dollars per year
 - ☐ Decreasing by 82% per year
 - ☐ Decreasing by 82 thousand dollars per year
 - ☐ Increasing by 18% per year
 - ☐ Increasing by 18 thousand dollars per year
 - ☐ Decreasing by 18% per year
 - ☐ Decreasing by 18 thousand dollars per year
-

Problem 20 (5 pts). The amount, A (in mg), of a drug in the body is 25 when it first enters the system and decreases by 12% each hour. A possible formula for A as a function of t , in hours after the drug enters the system, is:

- ☐ $A = 25 + 12t$
- ☐ $A = 25 - 12t$
- ☐ $A = 25 + 0.12t$
- ☐ $A = 25 - 0.12t$
- ☐ $A = 25(0.12)^t$
- ☐ $A = 25(0.88)^t$
- ☐ $A = 25(1.12)^t$
- ☐ $A = 25(1.88)^t$
- ☐ $A = 25(-0.12)^t$