

**Name:** \_\_\_\_\_

**VIP ID:** \_\_\_\_\_

- Write your name and VIP ID in the space provided above.
  - The test has eight (8) 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 rate of change of sales over the period 1997 to 2001 is:

- ☐ 7.5 million dollars/year
  - ☐ 7.5 million dollars
  - ☐ 38 million dollars/year
  - ☐ 38 million dollars
  - ☐ 9.5 million dollars/year
  - ☐ 9.5 million dollars
  - ☐ 15 million dollars/year
  - ☐ 15 million dollars
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**Problem 2** (5 pts). Find the domain of the function  $f(x) = 5\sqrt{x+3}$ .

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**Problem 3** (5 pts). We are trying to decide between two plumber companies to fix a sink. The first company charges \$50 for a service call, plus an additional \$36 per hour for labor. The second company charges \$35 for a service call, plus an additional \$39 per hour of labor. At how many hours will the two companies charge the same amount of money?

**Problem 4** (5 pts).

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**Problem 5** (5 pts). The cost in dollars to produce  $q$  tons of an item is given by the cost 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 with  $x$ -intercept at  $(-2, 0)$  and  $y$ -intercept at  $(0, -3)$ .

- ☐  $y = 4 + 3(x - 2)$
- ☐  $y = 8 - \frac{1}{3}(x - 8)$
- ☐  $y + 3 = -\frac{3}{2}x$
- ☐  $y = 4 + \frac{4}{5}x$

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

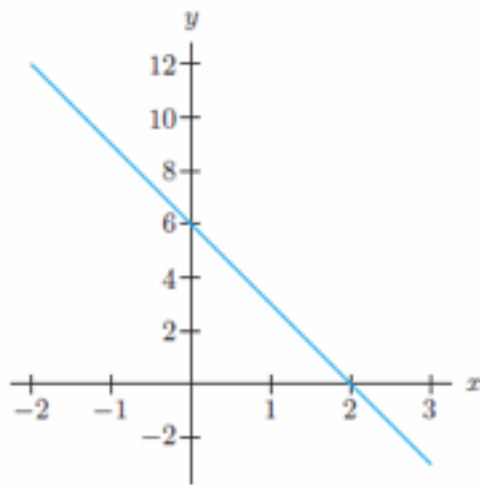


Figure 1.3

- ☐  $y = 6x + 6$
- ☐  $y = -3x + 6$
- ☐  $y = -3x + 2$
- ☐  $y = 6x - 2$

**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:

$$(x - 4)(x + 3)(x + 6) < 0$$

**Problem 11** (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:

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

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

$f(x)$	power function?	$k$	$p$
$5\sqrt{x}$			
$17^x$			
$(3x^5)^2$			
$\frac{5}{2\sqrt{x}}$			
$\pi$			

**Problem 13** (5 pts).

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**Problem 14** (5 pts). The solution to  $200 = 30e^{0.15t}$  is:

☐  $t = \frac{\ln(200/30)}{\ln(0.15)}$

☐  $t = \frac{\ln(200/30)}{0.15}$

☐  $t = \ln\left(\frac{200}{30(0.15)}\right)$

☐  $t = \frac{200}{30} \ln(0.15)$

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**Problem 15** (5 pts).

**Problem 16** (5 pts).

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**Problem 17** (5 pts).

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**Problem 18** (5 pts). The concentration of a pollutant in a lake is 85 parts per million (ppm) and is increasing at a rate of 4.6% each year. A possible formula for the concentration  $C$  as a function of year  $t$  is:

- ☐  $C = 85 + 4.6t$
- ☐  $C = 85 - 4.6t$
- ☐  $C = 85 + 0.046t$
- ☐  $C = 85 - 0.046t$
- ☐  $C = 85(0.046)^t$
- ☐  $C = 85(0.954)^t$
- ☐  $C = 85(1.046)^t$
- ☐  $C = 85(1.46)^t$
- ☐  $C = 85(0.46)^t$
- ☐  $C = 46(0.85)^t$

**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 number  $N$  of species of reptiles found on an island is proportional to the fourth root of the area of the island,  $A$ . Which of the following represents this statement?

- ☐  $N = A^{1/4}$
- ☐  $A = N^{1/4}$
- ☐  $N = A^{-4}$
- ☐  $A = N^{-4}$
- ☐  $N = kA^{1/4}$
- ☐  $A = kN^{1/4}$
- ☐  $N = kA^{-4}$
- ☐  $A = kN^{-4}$