
Math 122: Test 1

Signature _____

Printed Name _____

Student ID _____

Instructions: Sign and print your name and write your student ID number in the spaces provided above. Read each question below and decide which choice (a, b, c, or d) best answers the question. Circle the letter corresponding to your choice of the best answer. Each problem is worth 6 points. If you choose the correct answer, you will receive 6 points for the problem. If you choose an incorrect answer, you will receive 0 points for the problem. If you leave a problem blank (that is, if you do not circle a letter), then you will receive 1.5 points for the problem. It is up to you to make sure that your choice for an answer or lack thereof is clear. If I have to guess at what you mean (for example, if you circle or leave marks around two letters in the same problem), then you will be given 0 points for the problem.

Caution: Your eyes should stay on your own work. Please take note that the correct answers on the tests near you may differ from your own test paper regardless of the color of the tests.

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1. A cell phone company charges a monthly fee of \$30 plus \$0.06 per minute of usage. Which of the following is a formula for the monthly charge, C , in dollars, as a function of the number of minutes, m , the phone is used during the month?

(a) $C = 30m + 0.06$ (b) $C = 30 + 0.06m$ (c) $C = 30m - 0.06$ (d) $C = 30 - 0.06m$

2. What is the value of t if $3 = 10 \cdot 7^t$?

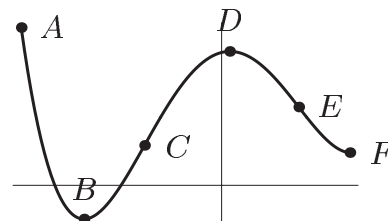
(a) $\frac{\ln(3)}{7\ln(10)}$ (b) $\frac{\ln(7)}{\ln(3/10)}$ (c) $\frac{\ln(3)}{10\ln(7)}$ (d) $\frac{\ln(0.3)}{\ln(7)}$

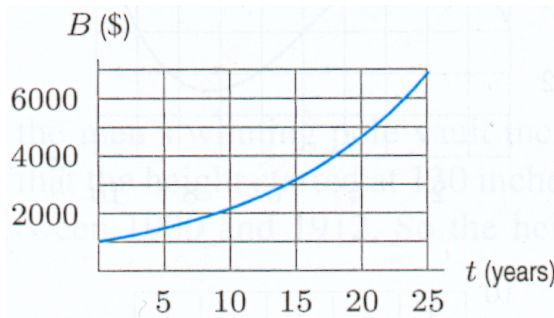
3. Suppose \$1000 is invested in an account paying interest at a rate of 2% compounded continuously. Which of the following expressions is used to determine the amount of dollars in the account 6 years later?

(a) $1000e^{0.12}$ (b) $1000(1.02)^6$ (c) $1000\left(1 + \frac{0.02}{12}\right)^{12 \cdot 6}$ (d) $1000 \cdot 6^{1.02}$

4. Where is the function graphed to the right decreasing and concave downward?

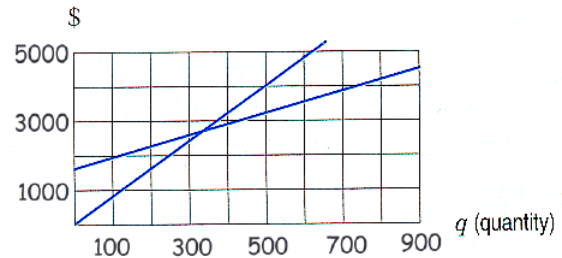
(a) between D and E (b) between C and D
(c) between B and C (d) between A and B





The balance, B , in an interest-bearing account t years from the initial deposit.

Figure 1



Cost and revenue functions for a company.

Figure 2

5. As indicated, Figure 1 shows the balance, B , in an interest-bearing account t years from the initial deposit. What was the original deposit?

(a) \$7000	(b) \$6000	(c) \$2000	(d) \$1000
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6. Which of the following is nearest to the number of years it takes for the balance in the account from Figure 1 to first exceed \$2000.

(a) 15	(b) 20	(c) 5	(d) 10
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7. If $f(t)$ is the function given in Figure 1, then which of the following can one deduce from estimating the value of $f(15)$?

(a) The account earns slightly more than \$3000 in interest during the first 15 years.	(b) The account totals slightly more than \$3000 at the beginning of the 15 th year.	(c) The account earns over \$4000 in interest in the first 15 years.	(d) The account totals over \$4000 on the 15 th year.
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8. As indicated, Figure 2 is a graph of the cost and revenue functions for a company. You are to determine which one is likely to be the cost function and which is likely to be the revenue function. Which of the following indicates the approximate profit the company makes by producing a quantity of 500 items?

(a) \$700	(b) \$1500	(c) \$3300	(d) \$4000
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9. What is the break-even point, q_0 , associated with Figure 2?

(a) 900	(b) 630	(c) 330	(d) 200
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10. In Figure 2, approximately what quantity of items does the company have to produce to start making a profit?

(a) 900	(b) 630	(c) 330	(d) 200
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11. Suppose the mass (or size) of a 100 gram bar of soap *decreases* at a rate of 10% each day. Which of the following indicates the grams of soap present after t days?
- (a) $100e^{0.9t}$ (b) $100(0.9)^t$ (c) $100e^{0.1t}$ (d) $100(1.1)^t$
12. What is the exponential decay rate associated with the function $f(t) = 5000(0.97)^t$?
- (a) -97% (b) -1.3% (c) -3% (d) -1.97%
13. If $f(x) = x^2 + 1$ and $g(x) = x^3$, then what is the value of $f(g(2))$?
- (a) 125 (b) 1.4 (c) 40 (d) 65
14. The number of reported offenses of violent crime in the United States between 1883 and 1988 are given by the table directly below. What is the average rate of change of reported offenses from 1984 to 1986?

Year	1983	1984	1985	1986	1987	1988
Reported Offenses (in millions)	1.258	1.273	1.329	1.489	1.484	1.566

- (a) 216,000 reported offenses per year
 (b) 108,000 reported offenses per year
 (c) 122,000 reported offenses per year
 (d) 154,000 reported offenses per year
15. Which of the following is *not* a power function?
- (a) \sqrt{x} (b) $x + 1$ (c) x^3 (d) $\frac{2}{3x}$
16. Table 1 below indicates the population in a small city for certain years from 1980 to 2000. If the population is growing exponentially, which of the following indicates most accurately the exponential growth rate of the population? (To help with the computations, you may want to make use of one of the values indicated in Table 2.)

Year	1980	1984	1988	1992	1996	2000
Population	1000	1082	1172	1268	1373	1486

Table 1

- (a) 9% (b) 8% (c) 2% (d) 31%

	Approximate Value
$(1.082)^{0.25}$	1.02
$(1.082/4)^{0.25}$	0.072
$\ln(1.082/4)$	-1.31
$\ln(1.082)$	0.08
$e^{1.082/4}$	1.31
$e^{0.082}$	1.09

Table 2