TEST 1 PROBLEMS

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) $C = 30 - 0.06m$

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(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) $\dfrac{\ln(3)}{7\ln(10)}$

(b) $\dfrac{\ln(7)}{\ln(3/10)}$

(c) $\dfrac{\ln(3)}{10\ln(7)}$

(d) $\dfrac{\ln(0.3)}{\ln(7)}$

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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?
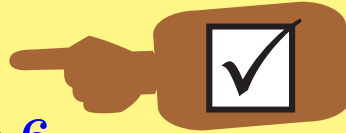
(a) $1000\,e^{0.12}$

(b) $1000(1.02)^6$

(c) $1000\left(1 + \frac{0.02}{12}\right)^{12\cdot6}$

(d) $1000 \cdot 6^{1.02}$

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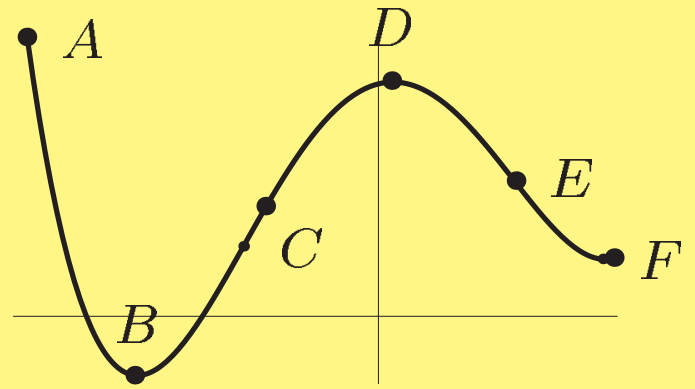
 (a) $1000\,e^{0.12}$

 (b) $1000(1.02)^6$

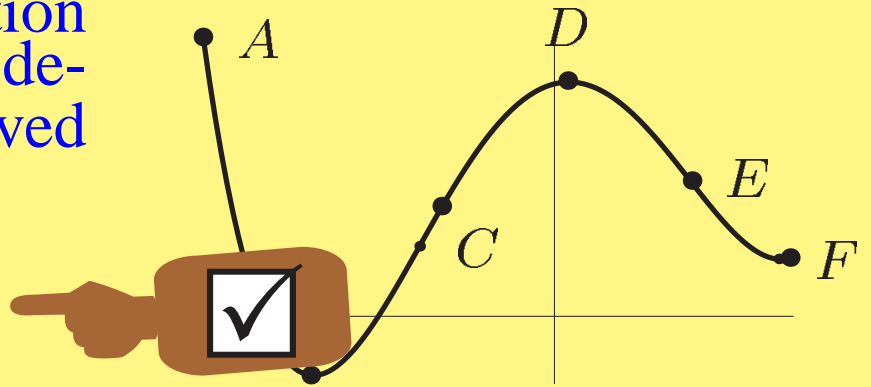 (c) $1000\left(1 + \frac{0.02}{12}\right)^{12 \cdot 6}$

 (d) $1000 \cdot 6^{1.02}$

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

(a) between D and E
(b) between C and D
(c) between B and C
(d) between A and B
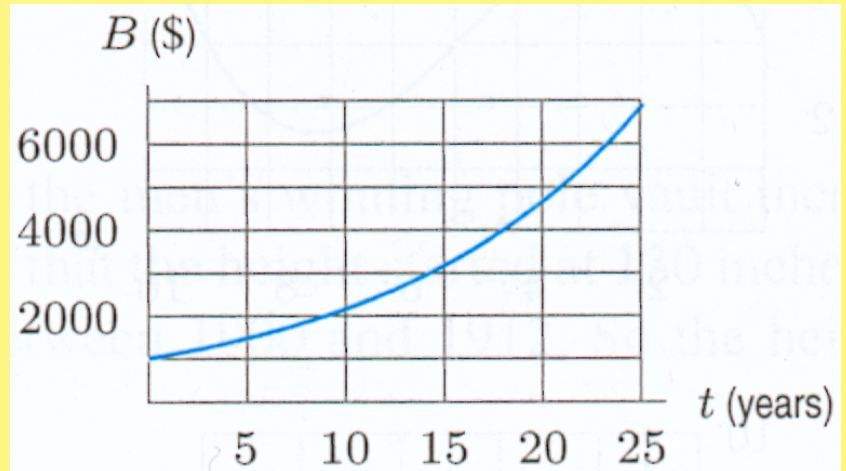
4. Where is the function graphed to the right decreasing and concaved downward?

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

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

The balance, B, in an interest-bearing account t years from the initial deposit.
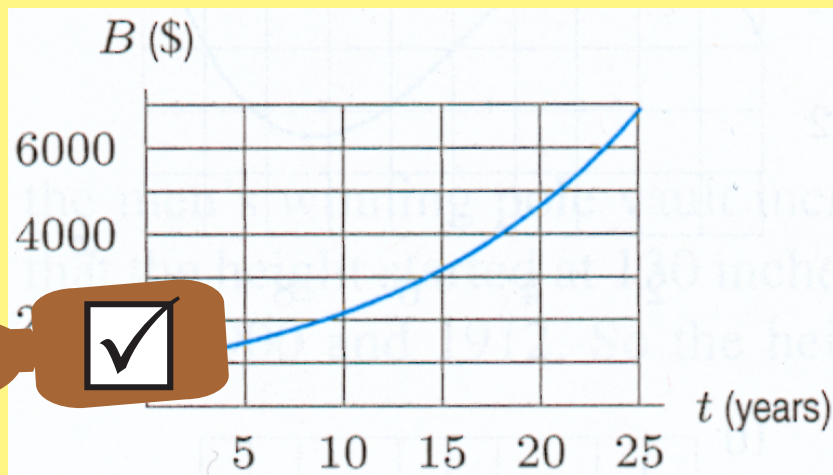
Figure 1

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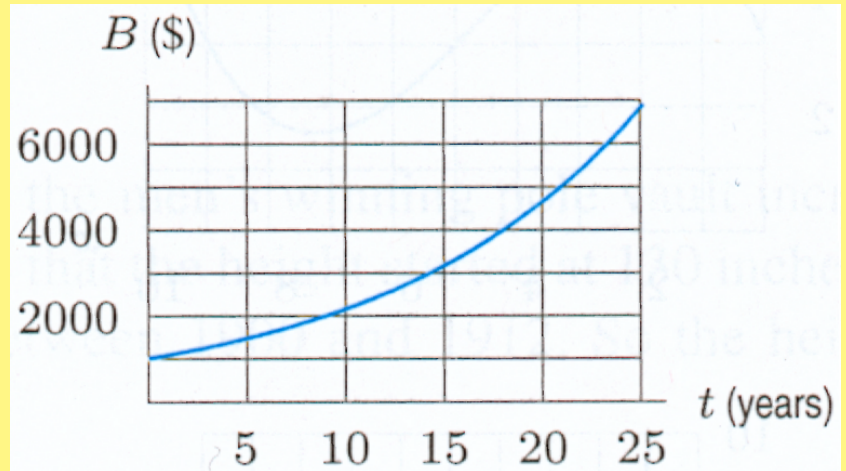
(a) $7000

(b) $6000

(c) $2000

(d) $1000 ✓

B ($)

6000

4000

5   10   15   20   25

t (years)

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

Figure 1

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

The balance, B, in an interest-bearing account t years from the initial deposit.
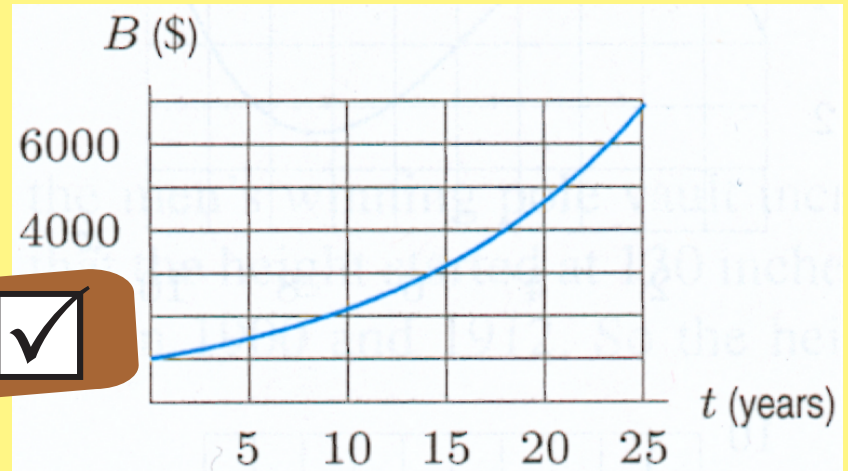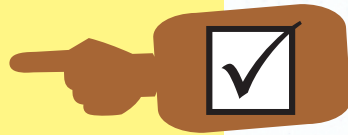
Figure 1

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(a) 15

(b) 20

(c) 5

(d) 10 ✓

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

Figure 1

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 15th year.

    (c) The account earns over $4000 in interest in the first 15 years.

    (d) The account totals over $4000 on the 15th year.

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    (d) The account totals over $4000 on the 15th year.

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**

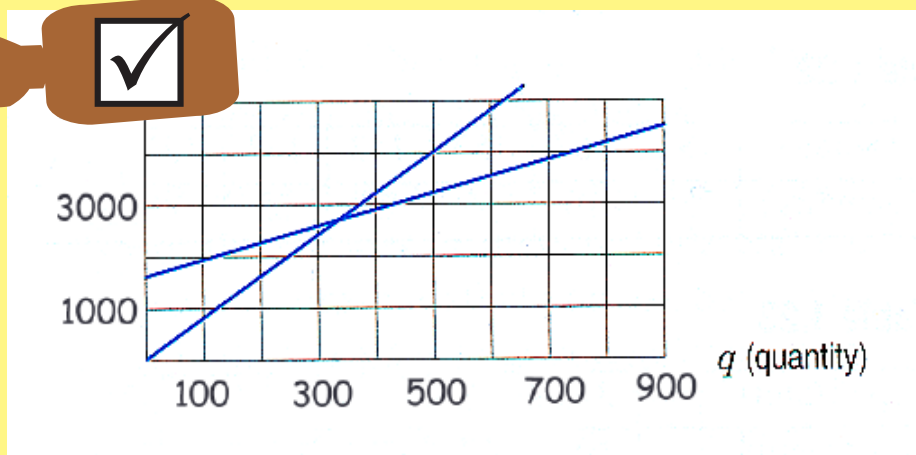(b) **$1500**

(c) **$3300**

(d) **$4000**
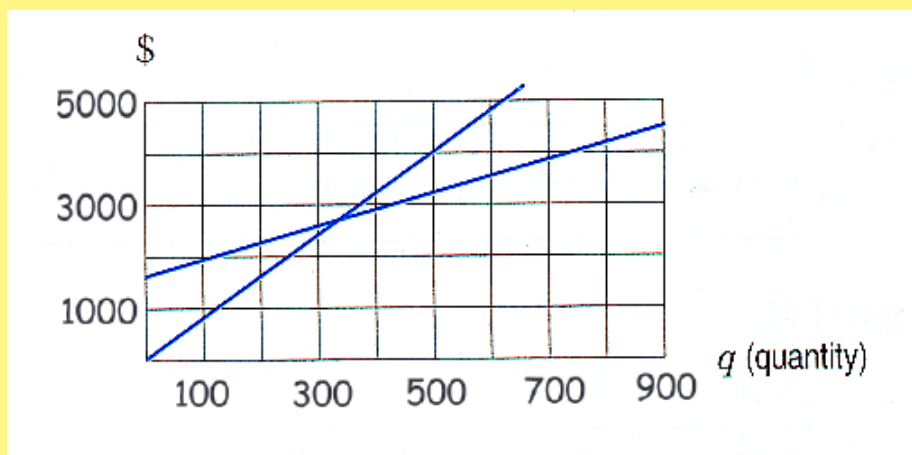
Cost and revenue functions for a company.

Figure 2

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(b) **$1500**

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(d) **$4000**

Cost and revenue functions for a company.

Figure 2

9. What is the break-even point, q_0, associated with Figure 2?

(a) **900**
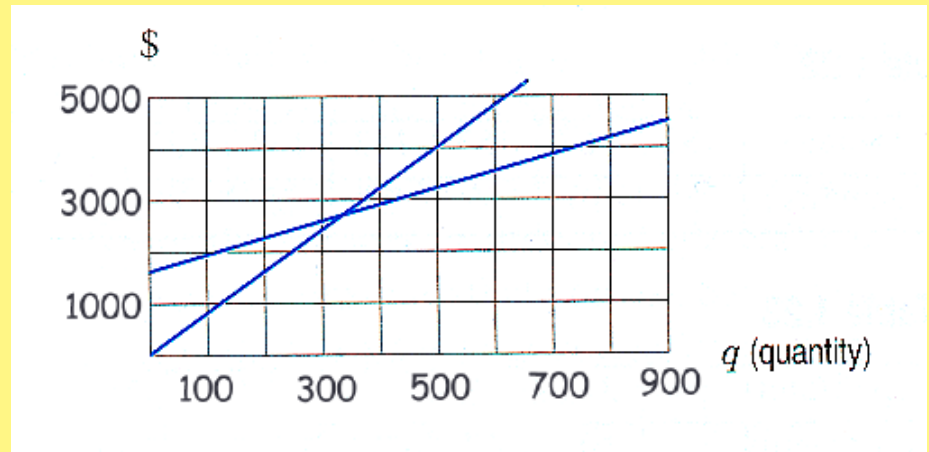
(b) **630**

(c) **330**

(d) **200**

Cost and revenue functions for a company.

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(a) **900**

(b) **630**

(c) **330**

(d) **200**

Cost and revenue functions for a company.

Figure 2

10. In Figure 2, approximately what quantity of items does the company have to produce to start making a profit?
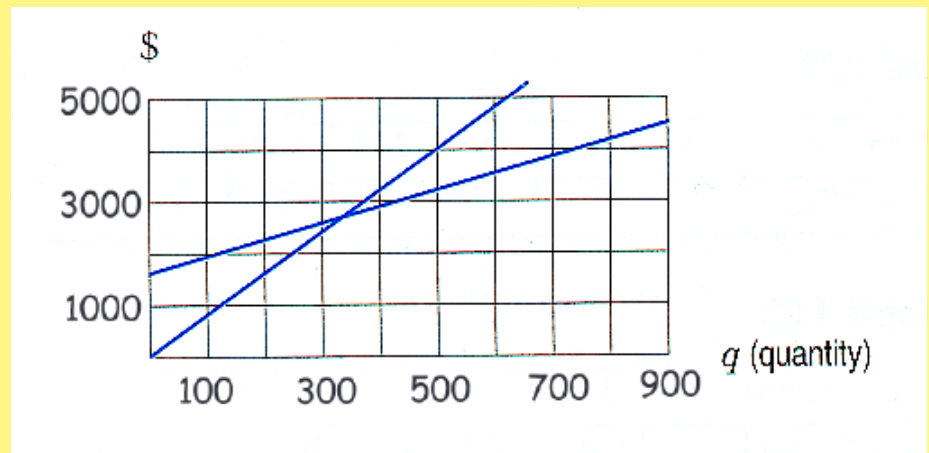
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Cost and revenue functions for a company.

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(a) **900**

(b) **630**

(c) **330** ✓

(d) **200**

Cost and revenue functions for a company.

Figure 2

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) $100e^{0.9\,t}$

(b) $100(0.9)^t$

(c) $100e^{0.1\,t}$

(d) $100(1.1)^t$

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) $100e^{0.9\,t}$

    (b) $100(0.9)^{t}$ ☑

    (c) $100e^{0.1\,t}$

    (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%

12. What is the exponential decay rate associated with the function $f(t) = 5000(0.97)^t$?

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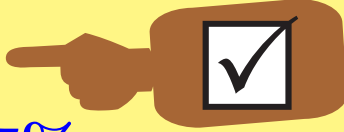
13. If $f(x) = x^2 + 1$ and $g(x) = x^3$, then what is the value of $f(g(2))$?

      (a) 125

      (b) 1.4

      (c) 40

      (d) 65

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      (b) 1.4

      (c) 40

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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

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15. Which of the following is *not* a power function?

(a) $\sqrt{x}$

(b) $x + 1$

(c) x^3

(d) $\dfrac{2}{3x}$

15. Which of the following is *not* a power function?

    (a) $\sqrt{x}$

    (b) $x + 1$ ✓

    (c) x^3

    (d) $\dfrac{2}{3x}$

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

	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

(a) 9%   (b) 8%

(c) 2%   (d) 31%

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

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