Name_____ MATH 1090 TEST 2 instructor:

date____ _ _ _ Oct 2010____ 50 minutes with calculator

Work problems completely, either on this paper, or on another sheet, which you include with this paper.
Credit will be given for work. Circling correct answer without work to support the answer will not receive credit.
If you turn in work on another paper, number the problems so they can be found and read.
If you answer "none of the preceding," tell what the answer should be.

1. Joe secured a loan of \$12,000 3 yr ago from a bank for use toward his college expenses. The bank charged interest at the rate of $4\%/_{\text{year}}$ compounded monthly on his loan. Now that he has graduated from college, Joe wishes to repay the loan by amortizing it through monthly payments over 10 yr at the same interest rate. Find the size of the monthly payments he will be required to make.

   a) \$121.49 b) \$81.49 c) \$98.77

   d) \$999.49 e) \$1479.49 f) none of the preceding

2. Determine the simple annual interest rate at which \$1500 will grow to \$1600 in 10 months.

   a) 5.6% b) 6.7% c) 7.8%

   d) 8.0% e) 8.9% f) none of the preceding

3. The concentration of a drug in an organ at any time t (in seconds) is given by $x(t) = 0.08(1 - e^{-0.02t})$ where $x(t)$ is measured $^{\text{grams}}/_{\text{cubic centimeter}}$ ($^{\text{g}}/\text{cm}^3$). How long would it take for the concentration of the drug in the organ to reach 0.04 $^{\text{g}}/\text{cm}^3$?

   a) 0.00006 sec b) 0.006 sec c) 35 sec

   d) 60 sec e) 0.35 sec f) none of the preceding

4. The percentage of families that were married households between 1970 and 2000 is approximately $P(t) = 86.9e^{-0.05t}$ where t is measured in decades, with $t = 0$ corresponding to the beginning of 1970. If this trend continues, what percentage of families were married households at the beginning of 2010?

   a) 1.2% b) 6.8% c) 7.1%

   d) 7.5% e) 118% f) none of the preceding

5. The national debt has increased about 8% each of the last fifteen years, which is 3% larger than OEM had recommended. If the national debt was $5.54 trillion in 2000, what was the debt in 2005 according to these data?

a) $8.14 trillion b) $7.07 trillion c) $8.87 trillion

d) $8.79 trillion e) $7.54 trillion f) none of the preceding

6. The Morellis have accumulated $50,000 that they intend to use as a down payment toward the purchase of a new home. Neglecting taxes and insurance, they have estimated that they will pay about $2,000 a month toward the principle. If the present annual mortgage rate is about 4% for a 30-year fixed rate mortgage, about what price should they consider?

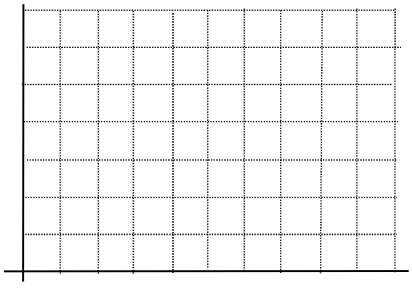
7. A certain piece of machinery was purchased three years ago by Garland Mills for $500,000. Its present resale value is $320,000. Assuming that the machine's resale value decreases exponentially, what will it be four years from now?

8. A company's sales of cyber security systems are shown in the adjacent table.

Year	Sales ($100,000)
2003	145
2004	154
2005	175
2007	215
2009	240

a. Since the company expects the sales growth to eventually level out, find the logistic regression model, letting 2003 correspond to 2003, the company's first year.

b. Plot the graph of the function for its first twenty years, assuming all present conditions continue.



9. Robert and some friends are planning to secure a 10 year balloon mortgage of $240,000 to finance the purchase of a condominium. The monthly payments are based on a 20-year amortization when the prevailing APR was $3.75\%/_{\text{year}}$ compounded monthly.

   a. What will the group's monthly payments be?

   b. What will the "balloon" payment be at the end of ten years?

10. Express the equation $16^{-1/4} = 0.5$ in logarithmic form.

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Formulas:

$$S = R\left[\frac{(1+i)^n - 1}{i}\right] \qquad A = Pe^{rt} \qquad r_{\text{eff}} = \left(1 + \frac{r}{m}\right)^m - 1$$

$$S = P(1+r)^t \qquad P = R\left[\frac{1-(1+i)^{-n}}{i}\right] \qquad S_n = \frac{a(1-r^n)}{1-r} \text{ if } r \neq 1$$

$$S_n = \frac{n}{2}[2a + (n-1)d] \qquad a_n = a + (n-1)d \qquad a_n = ar^{n-1}$$

Answers — Math 1090, Test 2, FALL 2010

1. sect'n 4.3, #32, **A** $\dfrac{\overline{\quad}}{\overline{\quad}}$ or **F: \$136.96** $\dfrac{\overline{\quad}}{\overline{\quad}}$ **'cuz \$13,527.26 =** $\overline{\quad}$

2. sect'n 4.1, #10, **D**

3. sect'n 3.2, #68, **C**

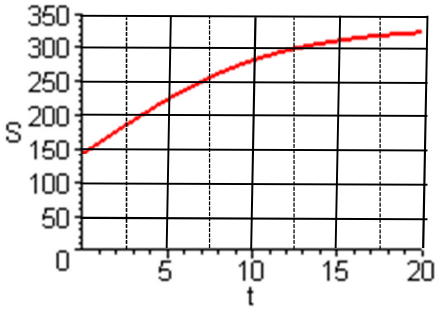
4. sect'n 3.1, #38, **C**

5. sect'n 4.4, #33, **A**

6. sect'n 4.2, #27, **\$469,000**

7. sect'n 3.3, #7, **\$176,500 (continuous)**
   either $i \approx$ **-0.14, \$174,000 (annual)**

8. sect'n 3.3, tech#10, a. $S(t) =$ _____ b.



9. sect'n 4.3, #45, a. **\$1422.93 =** $\dfrac{\overline{\quad}}{\overline{\quad}}$ b. **\$142,206.10 =** $\dfrac{\overline{\quad}}{\overline{\quad}}$

10. sect'n 4.2, #10, $\log_{16} 0.5 = {}^{-1}/_{4}$

Text Sect'n	test prob #
3.1	- 4
3.2	- 3
3.3	- 7, 8
4.1	- 2
4.2	- 6, 10
4.3	- 1, 9
4.4	- 5