**You must show work for all problems.**

**1.** Solve the following equations for $x$.

**(a).** $45250 = 50(1.03)^{4x}$

**(b).** $250 = 300 - 300e^{-0.02x}$

**(c).** $\log_3(2x+4) = -1$

**(d).** $\ln x - \ln 4 = 3$

**2.** The demand function for a product is given by $p = 2000e^{-q/4}$.

**(a).** At what price per unit will the quantity demanded equal 10 units?

**(b).** If the price is 89.50 per unit, how many units will be demanded, to the nearest unit.

**3.** \$2400 is invested for 18 months at an annual *simple* interest rate of 4%.

**(a).** How much interest will be earned?

**(b).** What is the future value after 18 months?

**4.** If you want to earn 5% annual simple interest on an investment, how much should you pay for a note that will be worth \$12,000 in 10 months?

**5.**

**(a).** Find the 72nd term of the arithmetic sequence with first term 4 and common difference $-\frac{1}{4}$.

**(b).** Find the common difference of an arithmetic sequence with first term 3 and tenth term 39.

**(c).** Find the sum of the first 90 terms of an arithmetic sequence with the first term 7 and common difference 2.

**6.** What is the future value and interest earned if \$5500 is invested for 3 years at 6%

**(a).** Compounded quarterly?

**(b).** Compounded continuously?

**7.** What lump sum do parents need to deposit in an account earning 9% compounded monthly so that it will grow to \$140,000 for their daughter's college tuition in 18 years.

**8.** How long does it take for an account containing \$2000 to be worth \$5000 if the money is invested at 4% compounded quarterly.

**9.** Find the annual percentage yield for an investment at

**(a).** 7.5% compounded semi-annually.

**(b).** 6.8% compounded continuously.

**10.** Find the future value of an ordinary annuity of \$3000 paid at the end of each quarter for 10 years, if it earns 5% compounded quarterly.

**11.** You want to save \$30,000 in 3 years for a down payment on a house. If you make monthly deposits into an account paying 9% compounded monthly, what is the size of the payments that is required to meet this goal.

**12.** Find the present value of an ordinary annuity of \$1500 paid at the end of each 6-month period for 12 year if the interest rate is 8%, compounded semiannually.

**13.** How much is needed in an account that earns 7.2% compounded monthly in order to withdraw \$1200 at the end of each month for 20 years?

**14.** A recent graduate's student loans total $48,000. If these loans are at 2.8% compounded quarterly, for 10 years, what are the quarterly payments.

**15.** Suppose a loan of $35,000 with interest at 8%, compounded semiannually, is to be repaid in 2 years by making 4 semiannual payments of equal size.

**(a).** Develop an amortization schedule for the loan.

| Period | Payment | Interest | Balance Reduction | Unpaid Balance |
|---|---|---|---|---|
| | | | | 35000.00 |
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| | | | | |

**(b).** Find the total interest paid.

**16.** Section 9.1 #5, 9, & 61

**17.** Find the following limits, if they exist. [You must show work.]

**(a).** $\lim_{x\to 2}(3x^2 - x + 1)$ **(b).** $\lim_{x\to 3}\dfrac{x^2-9}{x^2-x-6}$ **(c).** $\lim_{h\to 0}\dfrac{3(x+h)^2-3x^2}{h}$

**18.** Find the average rate of change of $f(x) = 2x^2 - 3x$ over the interval $[2, 2.5]$.

**19.** Given $f(x) = x^2 - 4x$

**(a).** <u>**Use the limit definition**</u> $\lim_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$, to show that the derivative $f'(x)$ is $2x-4$.

**(b).** Find the instantaneous rate of change of $f$ at $x = -3$. **(b).** Find the slope of the tangent line at $x = -3$.

For the remainder of the review sheet, use the DERIVATIVE FORMULAS, not the limit definition!

**20.** Find the derivative of given functions.

**(a).** $f(x) = 3x^4 - 4x^2 + 25x - 3$ **(b).** $s(t) = \dfrac{3}{t^4} - \dfrac{5}{t^2} + 6\sqrt{t}$

**21.** Find the equation of the tangent line to $y = 2x^3 - 3x + 1$ at $x = -1$.

**22.** Find the point(s) where the graph of $f(x) = x^4 - \frac{8}{3}x^3 + 10$ has horizontal tangent line(s).

**23.** If the cost for a commodity is $C(x) = 200 + 5x + .04x^2$ dollars, find and interpret the marginal cost at $x = 10$ units.

**24.** Suppose that the demand for a product depends on price $p$ according to $q = \dfrac{30000}{p^2} - \dfrac{3}{4}$, $p > 0$, where $p$ is in dollars. Find and explain the meaning of the instantaneous rate of change of demand with respect to price when $p = 30$.