College Mathematics, Exam 4, Prac, Spring 2013 NAME: key
Camp Lemonnier, Djibouti

Answer the following questions in the space provided. If you need more room, write "BACK," and use the back of the sheet. For full credit, show all of your work, demonstrating an understanding of material covered in our course. You may use your formula sheet. You have 50 minutes. Good luck!

1. (4 points) Express the fraction as a percent. $\frac{3}{40}$

$\frac{3}{40} = 0.075 = 7.5\%$

2. (4 points) Express the decimal as a percent. 0.007

0.7%

3. (4 points) Express the percent as a decimal. 325%

3.25

4. A dictionary that normally sells for \$27.50 is on sale at 20% off.

   a. (4 points) What is the discount amount?

$$\begin{array}{r} \$27.50 \\ \times\ 0.2 \\ \hline \$5.5 \end{array}$$

\$5.50 off

   b. (4 points) What is the dictionary's sale price?

$$\begin{array}{r} \$27.50 \\ -\ \$5.50 \\ \hline \$22.00 \end{array}$$

5. (10 points each)

a. If \$3,000 is borrowed at the simple interest rate 6% for 2 years, find the loan's future value (the total amount due in 2 years).

$$A = P(1+rt)$$

$$= 3000(1+(0.06)(2)) = 3360$$

\$ 3360

b. Determine the present value you must invest at 3% compounded daily to have the future value \$3,500 in 5 years. .

daily: 365 times per year, $n = 365$

~~$A = P\left(1+\frac{r}{n}\right)^{nt}$~~ $\quad P = \dfrac{A}{\left(1+\frac{r}{n}\right)^{nt}}$

$$P = \frac{3500}{\left(1+\frac{.03}{365}\right)^{(365)(5)}} = 3012.496$$

\$ 3012.50

c. Suppose you invest \$400 at the end of each month for 20 years. The interest rate is 5% compounded monthly. Find the value of the annuity (at the end of 20 years).

$n = 12$

$$A = \frac{P\left[\left(1+\frac{r}{n}\right)^{nt}-1\right]}{\left(\frac{r}{n}\right)} = \frac{400\left[\left(1+\frac{0.05}{12}\right)^{(12)(20)}-1\right]}{\left(\frac{0.05}{12}\right)}$$

$$= \$164{,}413.47$$

6. The price of a house is $225,000. You will make a 20% down-payment. There are no points on the loan. You will borrow the balance of the price of the house with a 15-year fixed-rate mortgage at 4.25%.

$n = 12$

a. (5 points) What is the amount of the down payment?

$(0.2)(225000) = \$45000$

b. (5 points) How much money will you borrow?

$225000 − 45000 = 180000$

$\$180,000$

c. (8 points) What will your monthly mortgage payment be (excluding escrow)?

$$PMT = \frac{P\left(\frac{r}{n}\right)}{\left[1-\left(1+\frac{r}{n}\right)^{-nt}\right]} = \frac{(180000)\left(\frac{.0425}{12}\right)}{\left[1-\left(1+\frac{.0425}{12}\right)^{-(12)(15)}\right]}$$

$= \$1354.10$

d. (4 points) Find the total amount paid for the house.

$45000 + (1354.10)(12)(15) = \$288,738$

7. (4 points each) Evaluate each of the following. Write out enough of the calculation to indicate that you understand what is going on.

a. $5!$ $\quad 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$

b. $\frac{325!}{322!}$ $\quad \frac{325 \cdot 324 \cdot 323 \cdot 322 \cdot 321 \cdots}{322 \cdot 321 \cdots}$

$= 34,011,900$

8. (4 points) Evaluate $_{12}C_5$

$$nC_r = \frac{n!}{(n-r)!\,r!}$$

$$\frac{12!}{(12-5)!\,5!} = \frac{12!}{7!\,5!}$$

$$= \frac{12 \cdot 11 \cdot 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}{7 \cdot 6 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 \cdot 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1}$$

$$= 792$$

9. (8 points) A restaurant with a prix fixe menu offers a choice of red or white wine, three appetizers, two entrees, and two deserts. How many different ways can a patron order a meal at this establishment?

$$2 \cdot 3 \cdot 2 \cdot 2 = 24$$

10. (8 points) The Rotary Club of Metropolis has 37 members. In how many ways can this organization select a President, Vice-President, Secretary, and Treasurer if each member is eligible for each of the offices and willing to serve?

$$nP_r = \frac{n!}{(n-r)!}$$

$$_{37}P_4 = \frac{37!}{(37-4)!} = \frac{37!}{33!}$$

$$= 37 \cdot 36 \cdot 35 \cdot 34$$

$$= 1{,}585{,}080$$