Your final exam will be given on May 1st, 2007 from 3:30pm-5:30pm in LCB 225. There will be a total of 12 questions.

1 Venn Diagrams

- Know how to draw 2 and 3 set Venn diagrams.
- Be able to take information about set relationships from Venn diagrams.

2 Unit Conversions

- Be able to convert various measurements to different units given a conversion table.
- Know what the prefixes kilo \( (10^3) \), centi \( (10^{-2}) \), and milli \( (10^{-3}) \) mean and know how to use them to convert metric units.

3 Percentages

- \[
\frac{\text{New Value} - \text{Reference Value}}{\text{Reference Value}} = \text{Relative Difference.}
\]
- \[
\text{Reference Value}(100 \pm P)\% = \text{New Value.}
\]
Know the General Compound Interest Formula:

\[ A = P \times \left(1 + \frac{\text{APR}}{n}\right)^{nY}. \]

Use the compound interest formula for problems that ask how a single deposit of money accumulates wealth over a period of time.

Be able to invert the formula and solve for the principal given the accumulated value:

\[ P = \frac{A}{\left(1 + \frac{\text{APR}}{n}\right)^{nY}}. \]

Know what the annual percentage yield (APY) is, and be able to find it given an APR and compounding time.

\[ \text{APY} = \left(1 + \frac{\text{APR}}{n}\right)^n - 1. \]

Know the Continuous compounding interest formula:

\[ A = P \times e^{(\text{APR} \times Y)}. \]

Be able to calculate the total return (relative change in investment value) and the annual return (average APY over a period of years).

\[ \text{Total Return} = \frac{A - P}{P}, \quad \text{Annual Return} = \left(\frac{A}{P}\right)^{1/Y} - 1. \]

Know how (and when!) to use the Savings Plan and Loan Payment Formulas. The formulas will be given to you on the exam, but you will need to be able to use them to solve word problems.
5 Chapter 8

- Know the “Rule of 70” and when it’s a valid approximation (when $P$ is less than 15%). This rule works for both the Doubling time and for the Half-life (for half-life $P$ is the percent a quantity decreases by per time period).

$$T_d = \frac{70}{P} \quad \text{or} \quad P = \frac{70}{T_d}.$$ 

- Know the Doubling Time Formula for exponential growth:

$$N.V. = I.V. \times 2^{t/T_d}.$$ 

- Know the Half-Life Formula for exponential decay:

$$N.V. = I.V. \times \left(\frac{1}{2}\right)^{t/T_h}.$$ 

- Know the two logarithm rules:

$$\log_{10}(x \times y) = \log_{10}(x) + \log_{10}(y) \quad (1)$$

$$\log_{10}(x^y) = y \times \log_{10}(x) \quad (2)$$

- Know the Exact Doubling time and Half-life formulas or be able to manipulate the logarithm function to get them.

$$T_d = \frac{\log_{10}(2)}{\log_{10}(1 + r)},$$

$$T_h = -\frac{\log_{10}(2)}{\log_{10}(1 - r)}.$$ 

6 Linear and Exponential Models

- Know how to find the rate of change (slope) of a line, its $y$-intercept (when $x = 0$) and its $x$-intercept (when $y = 0$).

$$y = mx + b.$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}.$$ 

3
• Know how to use logarithms to solve for an exponent.

• Be able to find the fractional growth rate $r$ given the doubling time or the half-life of a function:

$$(1 + r)^{T_d} = 2 \Rightarrow 2^{1/T_d} - 1 = r.$$  

• Be able to solve for $t$ in the equation

$$N,V. = I,V. \times 2^{t/T_d} \Rightarrow t = T_d \frac{\log_{10}(N,V./I,V.)}{\log_{10}(2)}.$$  

7 Geometry

• Know the formulas for the areas of 2-D shapes, and the formulas for the surface area and volume of 3-D shapes.

<table>
<thead>
<tr>
<th>2D</th>
<th>Area</th>
<th>Perimeter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectangle</td>
<td>$l \times w$</td>
<td>$2 \times (l + w)$</td>
</tr>
<tr>
<td>Circle</td>
<td>$\pi r^2$</td>
<td>$2\pi r$</td>
</tr>
<tr>
<td>Triangle</td>
<td>$\frac{1}{2} b \times h$</td>
<td>$X$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3D</th>
<th>Volume</th>
<th>Surface Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Box</td>
<td>$l \times w \times h$</td>
<td>$2 \times (w \times l + w \times h + l \times h)$</td>
</tr>
<tr>
<td>Sphere</td>
<td>$\frac{4}{3} \pi r^3$</td>
<td>$4\pi$</td>
</tr>
<tr>
<td>Cylinder</td>
<td>$\pi r^2 h$</td>
<td>$2\pi r^2 + 2\pi rh$</td>
</tr>
</tbody>
</table>

• Know that length scales like the scaling factor, area scales like the square of the scaling factor, and volume scales like the cube of the scaling factor.