Due date: January 23, 2012

Problem 1.

a) What is the value of:

\[
\text{(cond }
\begin{array}{l}
[\text{\((<= n 1000)\) .040}] \\
[\text{\((<= n 5000)\) .045}] \\
[\text{\((<= n 10000)\) .055}] \\
[\text{\((> n 10000)\) .060}] \\
\end{array}
\text{)}
\]

when \( n \) is (i) 500, (ii) 2800, and (iii) 15000?

b) What is the value of:

\[
\text{(cond }
\begin{array}{l}
[\text{\((<= n 1000)\) \((* .040 1000)\)}] \\
[\text{\((<= n 5000)\) \((+ (* 1000 .040)\) \\
\quad (* (- n 1000) .045))}] \\
[\text{else \((+ (* 1000 .040)\) \\
\quad (* 4000 .045) \\
\quad (* (- n 10000) .055))}] \\
\end{array}
\text{)}
\]

when \( n \) is (i) 500, (ii) 2800, and (iii) 15000?

Problem 2. Some credit card companies pay back a small portion of the charges a customer makes over a year. One company returns

a) .25% for the first $500 of charges,
b) .50% for the next $1000 (that is, the portion between $500 and $1500),
c) .75% for the next $1000 (that is, the portion between $1500 and $2500),
d) and 1.0% for everything above $2500.

Thus, a customer who charges $400 a year receives $1.00, which is \(0.25 \times \frac{1}{100} \times 400\), and one who charges $1,400 a year receives $5.75, which is \(1.25 = 0.25 \times \frac{1}{100} \times 500 \) for the first $500 and \(0.50 \times \frac{1}{100} \times 900 = 4.50\) for the next $900.

Determine by hand the pay-backs for a customer who charged $2000 and one who charged $2600.

Define the function pay-back, which consumes a charge amount and computes the corresponding pay-back amount.
Use check-expect to formulate at least four tests for your function.

**Problem 3.**

a) The text function provided from 2htdp/image constructs an image that draws the given string, using the font size and color.

For instance:

(text "Hello" 24 "olive") produces the image

Hello

Develop a program that "grows" the image of “Hello World” using the text function on a 500 x 300 canvas. The image should be placed in the center of the canvas. Start the text size at 1 and stop growing when the size reaches 80.

b) Add a function that returns the text to size 1 when the mouse is clicked anywhere in the canvas. You can read about mouse events in DrRacket’s Help Desk—the on-mouse clause of big-bang is a good place to start.