University of Massachusetts Boston

Title

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Problem 1

Why should you use this template?

1. Latex makes it easier to have great looking homeworks

2. Latex "tex" files work great with revision control systems such as *svn* and *git*

3. Math is much easier to write $\displaystyle\sum_{i=0}^{\infty} i(1-p^+)^{i-1}p^+ = \frac{p^+}{(1-(1-p^+))^2}$

Problem 2

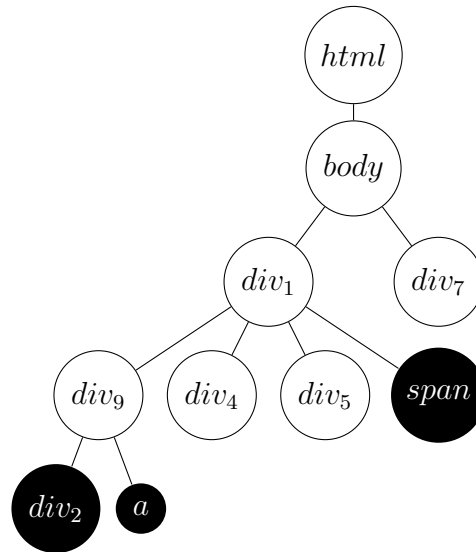You want to include images? Check out Figures 1 and 2.

Figure 1: The UMASS Boston Logo

Figure 2: The UMASS Boston Logo

Problem 3

You want to draw a tree? You can use the Tikz library.

Problem 4

You want to do some linear algebra?

$$V = \begin{pmatrix} v_{1,1} & \cdots & v_{1,n} \\ \vdots & \ddots & \\ v_{2,1} & \cdots & v_{2,n} \\ \vdots & \ddots & \\ v_{m,1} & \cdots & v_{m,n} \end{pmatrix}$$

$$\underbrace{rank(AB)}_{n} = \underbrace{rank(B)}_{\leq n} - dim(\underbrace{null(A)}_{0} \cap \underbrace{range(B)}_{n})$$

$$M_f = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

$$M_f M_g = \begin{pmatrix} ae + bg & af + bh \\ ce + dg & cf + dh \end{pmatrix} \tag{1}$$

Problem 5

So you want to write an algorithm?

Algorithm 1: Simple Tree Matching

Input: Tree a

 Tree b

Output: Integer *match*

1 **if** *a and b contain distinct symbols* **then**
2 return 0

3 **else**
4 $m \leftarrow$ the number of first-level sub-trees of a
5 $n \leftarrow$ the number of first-level sub-trees of b
6 $M[i, 0] \leftarrow 0$ for $i = 0, \ldots, m$
7 $M[0, j] \leftarrow 0$ for $j = 0, \ldots, n$
8 **for** $i = 1$ *to* m **do**
9   **for** $i = 1$ *to* n **do**
10    $x \leftarrow M[i, j - 1]$
11    $y \leftarrow M[i - 1, j]$
12    $z \leftarrow M[i - 1, j - 1] + SimpleTreeMatch(a_i, b_j)$
13    $M[i, j] \leftarrow max(x, y, z)$

14 return $M[m, n] + 1$