EXAM C QUESTIONS OF THE WEEK

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Week of October 30/06

X is a mixture of two exponential distributions.
Distribution 1 has a mean of 1 and a mixing weight of .25 and distribution 2 has a mean of 2 and a mixing weight of .75. X is simulated using the inverse transformation method with a uniform $(0, 1)$ value of .7. Find the simulated value of X.

Solution can be found below.

Week of October 30/06 - Solution

$F(x) = (.25)(1 - e^{-x}) + (.75)(1 - e^{-x/2})$.

We must solve for x from the equation $(.25)(1 - e^{-x}) + (.75)(1 - e^{-x/2}) = .7$.

The equation can be written as $.25e^{-x} + .75e^{-x/2} - .3 = 0$.
Substituting $y = e^{-x/2}$ results in the quadratic equation $y^2 + 3y - 1.2 = 0$.

Solving for y we get $y = \frac{-3 \pm \sqrt{3^2 - 4(-1.2)}}{2} = .3574\,,\ -3.3574$.

We ignore the negative root, since $y = e^{-x/2}$ must be > 0 .

Solving for x, we get $x = -2\,ln(.3574) = 2.06$.