STAT 400 SUMMER II 2001 (PROFESSOR GREEN)
SOLUTIONS TO PROBLEMS DUE AUGUST 8

58. The mean is 87850, and the variance is 19100116. If the X_i were not independent, the variance would not be additive, so the second computation would be incorrect.

62. The mean for the total time is 65 minutes and the standard deviation is $\sqrt{7.25} = 2.693$. The desired probability is .0316.

64.

(a) 45 minutes
(b) 68.33
(c) The expected value is 2 minutes and the variance is 13.67.
(d) The expected value is 10 minutes and the variance is 68.33.

66.

(a) The mean is 50 and the standard deviation is 10.3078.
(b) .0076
(c) The expected moment remains 50.
(d) This requires a formula for the variance of the product of two independently distributed variables, which turns out to be given (as derived in class) by

$$V(AX) = V(A)V(X) + V(A)\mu_X^2 + V(X)\mu_A^2.$$

Applying this to each of the products, one obtains a variance of 111.563 as opposed to a variance of 106.25 for constant coefficients.
(d) The covariance if X_1 and X_2 is .25, so the correlation of $5X_1$ and $10X_2$ is 12.5. It follows that the variance of the bending moment is 118.75.

72. The total time has mean 40 minutes and standard deviation $\sqrt{30}$. The desired time is 10:57.

74. X and Y are both binomial of respective types (50, .7) and (50, .6). The respective means are 35 and 30, and the variances are 10.5 and 12. The mean of the difference is 5 and the standard deviation is $\sqrt{22.5}$ Without the continuity correction, the desired probability is .4825.