Quiz 6
ECE302, Division II
Spring 2013

Student Name:_____

Grader Name:_____
Instructions: This is an open notes, open book, collaborative quiz. No Internet allowed.

Question: Let X be a one-dimensional normal random variable with mean equal to one and standard deviation equal to two. Use the standard normal table displayed to compute the following probabilities

a) Prob (X < 1.08)
b) Prob (X > 1.02)
c) Prob (1.02 < X < 1.08)
d) Prob (0.98 <X <1.18)
(Give the numerical values for each probability and write the intermediate steps you followed to get these values.)

Answer: $Y = \frac{X-1}{2}$ is a standard normal variable.

a) $\text{Prob}(X<1.08) = \text{Prob}(Y < \frac{1.08-1}{2}) = \text{Prob}(Y<0.04) = \phi(0.04) \cong 0.5160$

b) $\text{Prob}(X>1.02) = \text{Prob}(Y > \frac{1.02-1}{2}) = \text{Prob}(Y>0.01) = 1 - \text{Prob}(Y<0.01) = 1-\phi(0.01)$
$\cong 1 - 0.5040 = 0.4960$

c) $\text{Prob}(1.02<X<1.08) = \text{Prob}(0.01<Y<0.04) = \phi(0.04) - \phi(0.01)$
$\cong 0.5160 - 0.5040 = 0.0120$

d) $\text{Prob}(0.98<X<1.18) = \text{Prob}(\frac{0.98-1}{2} < Y < \frac{1.18-1}{2}) = \text{Prob}(-0.01<Y<0.09)$
$= \phi(0.09) - \phi(-0.01) = \phi(0.09) - (1-\phi(0.01))$
$\cong 0.5359 - 1 + 0.5040 = 0.0319$

Grade out of 20 first, then divide by 2

~~2 pts per correct numerical answer, &~~
4pts for correctly placed ≅ (1 per Q)
4pts for flow, clarity, sign (1 per Q)

a) 2 pts (1 just, 1 num)
b) 3 pts (2 just, 1 num)
c) 3 pts (2 just, 1 num)
d) 4 pts (3 just, 1 num)

Score: / 10