7.41) X = time to position $\mu_x = 11$, $\sigma_x = 2$, $\sigma^2 x = 4$
Y = time to attach $\mu_y = 20$, $\sigma_y = 4$, $\sigma^2 y = 16$

a) TOTAL meantime = $\mu_x + \mu_y = 11 + 20 = \boxed{31 \text{ sec}}$
b) NO. the meantime would not be changed by the change in variability.
c) $\sigma^2_{x+y} = \sigma^2 x + \sigma^2 y = 4 + 16 = 20$
$\boxed{\sigma_{x+y} = \sqrt{20} = 4.4721 \text{ sec}}$

7.42) a) 100-ohm → $N(100, 2.5) \leftarrow R_1$
250-ohm → $N(250, 2.8) \leftarrow R_2$

$\boxed{N(350, 3.753)}$

$T = R_1 + R_2$
$\mu_T = 100 + 250 = 350$ ohms
$\sigma_T = \sqrt{(2.5)^2 + (2.8)^2}$

$\sigma_T = 3.753$ ohms

b) $P(345 < T < 355) = P\left(\frac{345-350}{3.753} < \frac{T-350}{3.753} < \frac{355-350}{3.753}\right)$

$= P(-1.33 < Z < 1.33)$
$= 0.8172$

The prob. that the total resistance is between 345 & 355 ohms is ≈ 81.72%

7.43a) $\mu_x = 1.7176$ toys
$\sigma_x = 1.3106$ toys

7.44) a) GAIN 30% ∩ GAIN 30% = 1000(1.3)(1.3) = 1690
G ∩ L = 1000(1.3)(.75) = 975
or L ∩ G =
L ∩ L = 1000(.75)(.75) = 562.5

P(G∩G) = 0.25
P(G∩L or L∩G) = 0.5
P(L∩L) = 0.25

a) X = worth of stock

$P(X > 1000) \rightarrow P(X = 1690) = \boxed{0.25}$

b) $\mu_X = (1690)(0.25) + (975)(.5) + (562.5)(0.25)$

$\boxed{\mu_X = \$1050.63}$

7.45) F = SSHA scores for female st. $\mu_F = 120$, $\sigma_F = 28$, $\sigma^2_F = 784$

m = SSHA scores for male st. $\mu_m = 105$, $\sigma_m = 35$, $\sigma^2_m = 1225$

a) Randomly selected students would be unrelated

b) $\mu_{F-m} = \mu_F - \mu_m = 120 - 105 = 15$ points

$\sigma_{F-m} = \sqrt{(28)^2 + (35)^2} = 44.8219$ points

c) No... we don't know if scores are normally distributed.

7.47) a) $\mu_X = 550°C$

$\sigma_X = 5.7009°C$

b) $\mu_{X-550} = \mu_X - 550 = 0°C$

$\sigma_{X-550} = 5.7009°C$ ← wouldn't change

c) $Y = \frac{9}{5}X + 32$ $\quad \mu_{9/5X+32} = \frac{9}{5}\mu_X + 32$

$\boxed{= 1022°F}$

$\sigma_{\frac{9}{5}X+32} = \sqrt{\left(\frac{9}{5}\right)^2 \sigma^2_X} = \frac{9}{5}\sigma_X = \frac{9}{5}(5.7009) = \boxed{10.26°F}$

7.49) a) yes $\mu_{x+y} = \mu_x + \mu_y$

b) NOT UNLESS WE KNOW X & X ARE INDEPENENT!

7.50) T = TORQUE, S = capping strength

N(7, 0.9) N(10, 1.2)

a) Yes, they are sep. machines

b) $P(T>S) = P(T-S>0) = P\left(\frac{(T-S)+3}{1.5} > \frac{0+3}{1.5}\right)$

T−S is N(−3, 1.5)

$\mu_{T-S} = 7-10$

$\mu_{T-S} = -3$ $\sigma_{T-S} = \sqrt{(0.9)^2 + (1.2)^2}$

$\sigma_{T-S} = 1.5$

$= P(Z>2)$

$= 0.0228$

The prob. that the cap breaks is ~ 2.28%

7.51) a) $\sigma^2_y = 0.41$ trucks

$\sigma_y = 0.6403$ trucks

b) $\sigma^2_{x+y} = 0.89 + 0.41 = 1.3$

$\boxed{\sigma_{x+y} = \sqrt{1.3} = 1.1402 \text{ total vehicles}}$

c) $\sigma^2_{\cancel{350X+400Y}} = 350^2\sigma^2_x + 400^2\sigma^2_x$

$= 350^2(.89) + 400^2(.41)$

$= 174,625$

$\sigma = \sqrt{174,625} = \boxed{\$417.88}$

7.52) L = Leona's score N(24, 2)

F = Fred's score N(24, 2)

$P(|L-F| > 5) = P\left(\frac{|L-F|-0}{2.8284} \geq \frac{5-0}{2.8284}\right)$

N(0, 2.8284)

$= P(|Z| \geq 1.7678)$

$= 0.0771$

The prob. the scores differ by 5 or more points is 7.71%