Sorry No tex this week :'(

question 11.2.18

Arena	Suits (x)	Rev (y)	$x \cdot y$	x^2
Det	180	11.0	1980	32400
ord	26	1.4	36.4	676
MWK	68	3	204	4624
PHX	88	6	528	7744
CHaR	12	0.9	10.8	144
MIN	67	4	268	4489
SLC	56	3.5	196	3136
MIA	18	1.4	25.2	324
SAC	30	2.7	81	900
			3329.4	54437

a. Find $y = bx$: by question 11.2.14

$$b = \frac{\sum x_i y_i}{\sum x_i^2} = \frac{3329.4}{54437} = \boxed{0.612}$$

$$\boxed{y = 0.612x}$$

b. Find rev for 120 suits

$$y = 0.612(120)$$
$$\hat{y} = 7.339$$

The expected Revenue for 120 Suits is $\boxed{\$7.339 \text{ million}}$

Question 11.2.26

Species	x	y	log(x)	$\log(x)^2$	log(y)	log(x)·log(y)
HS	360	90	2.56	6.55	1.95	5.00
GG	165	105	2.22	4.92	2.02	4.48
FC	21	21	1.32	1.75	1.32	1.75
CF	23	26	1.36	1.85	1.41	1.93
ZN	11	14	1.04	1.08	1.15	1.19
TM	18	28	1.26	1.58	1.45	1.82
MM	18	21	1.26	1.58	1.32	1.66
PT	150	105	2.18	4.74	2.02	4.40
SS	45	68	1.65	2.73	1.83	3.03
CA	45	75	1.65	2.73	1.88	3.10
TH	18	46	1.26	1.58	1.66	2.09
			17.75	31.07	18.02	30.44

Fit Data to ax^b by the equation set fourth on page 535

$$b = \frac{n \sum \log(x)\cdot\log(y) - (\sum_i \log x_i)(\sum_i \log y_i)}{n \sum (\log x_i)^2 - (\sum_i \log x_i)^2}$$

$$b = \frac{(11)(30.44) - (17.75)(18.02)}{(11)(31.07) - (17.75)^2} = 0.561$$

$$\log a = \frac{\sum_i \log y_i - b \sum_i \log x_i}{n} = \frac{(18.02) - 0.561(17.75)}{11}$$

$$\log a = 0.733 \Rightarrow a = 10^{0.733} = 5.405$$

$$\boxed{y = 5.405\, x^{0.561}}$$

question 11.3.2

$y = 81.088 + 0.412x$ S.E $S = 11.78848$

(a) By Theorem 11.3.6 (pg 553) the confidence interval is

$$\hat{\beta}_1 - t_{\alpha/2, n-2} \cdot \frac{S}{\sqrt{\sum_i (x_i - \bar{x})^2}}, \quad \hat{\beta} + t_{\alpha/2, n-2} \frac{S}{\sqrt{\sum_i (x_i - \bar{x})^2}}$$

I will not copy the data here but

$$\sum_i (x_i - \bar{x})^2 = 380.46$$

$$\sqrt{\sum_i (x_i - \bar{x})^2} = 19.505$$

With $\hat{\beta}_1 = 0.412$

$t_{0.05/2, 24} = 2.0639$

$$\left[0.412 - 2.0639 \cdot (11.78848 / 19.505), 0.412 + 2.0639 \left(\frac{11.78848}{19.505}\right)\right]$$

$$\boxed{(-0.835, 1.659)}$$

(b) Since 0 is within the 95% confidence interval, we $\boxed{\text{can not}}$ reject the null hypothesis $H_0: \beta_1 = 0$

11.5.4 $\mu_x = 56$ $\sigma_x^2 = 1.2$ $\sigma_x = 1.09$ $\rho = 0.6$

$\mu_y = 11$ $\sigma_y^2 = 2.6$ $\sigma_y = 1.612$

$E(Y|x) = \mu_y + \frac{\rho\sigma_Y}{\sigma_x}(x - \mu_x)$ Theorem 11.5.1.b (572)

$11 + \frac{0.6(1.612)}{1.09}(55 - 56) = 10.113$

$Var(Y|x) = (1 - \rho^2)\sigma_y^2 =$ Theorem 11.5.1.c (572)

$(1 - 0.6^2)(2.6) = 1.664$

$\sigma_{y|x} = 1.289$

$P(10 < y < 10.5) = P\left(\frac{a-\mu}{\sigma} \le \frac{Y-\mu}{\sigma} \le \frac{b-\mu}{\sigma}\right)$

$= \frac{(10 - 10.113)}{1.289} \le Z \le \frac{10.5 - 10.113}{1.289}$

$-0.0876 \le Z \le 0.30$

$= 0.6179 \quad 0.4681$

$p = 0.1498$

$P(10.5 \le \bar{Y} \le 11) = \frac{a-\mu}{\sigma/\sqrt{n}} < \bar{Y} < \frac{b-\mu}{\sigma/\sqrt{n}}$

$\frac{10.5 - 10.13}{1.289/\sqrt{4}} < Z \le \frac{11 - 10.13}{1.289/\sqrt{4}}$

$0.6004 < Z < 1.376$

$0.9147 - 0.7257$

$p = 0.189$

question 11.4.2

$f_{xy}(x,y) = x+y \qquad 0 \le x, y \le 1$

Find $\rho(x,y)$

X, and y will be distributed equally so we only need to solve for x and the same goes for y

$f_x(x) = \int_0^1 (x+y)dy = x + \frac{1}{2}$ | theorom 3.72 (167)

$\mu_x = \int_0^1 x(x+\frac{1}{2})dx = \int_0^1 x^2 + \frac{1}{2}x = \frac{7}{12}$ | Def 3.5.1 (138)

$E(x^2) = \int_0^1 x^2(x+\frac{1}{2})dx = \int_0^1 x^3 + \frac{1}{2}x^3 = 5/12$

$var(x) = E(x^2) - \mu_x^2 = \frac{5}{12} - \left(\frac{7}{12}\right)^2 = \frac{11}{144}$ | theorem 3.6.1 (155)

$\sigma_x = \sqrt{var(x)} = \sqrt{11/144} = 0.276$

$E(xy) = \int_0^1\int_0^1 xy(x+y)dydx = \int_0^1 (x^2/2 + x/3)dx$

$= x^3/6 + x^2/6 \Big|_0^1 = 1/3$

$cov(x,y) = E(xy) - E(x)E(y)$ | Def 3.9.1 (188)

$= 1/3 - (7/12)(7/12) = -1/144$

$\rho(X,Y) = \frac{cov(x,y)}{\sigma_x \sigma_y} = \frac{-1/144}{(0.276)(0.276)}$ | Def 11.4.1 (56[illegible]

$\boxed{\rho(x,y) = -0.0912}$