1-13. From the data table below, calculate requested quantities.

$$\begin{pmatrix}
x & y & x^2 & y^2 & xy \\
1 & 2 & 1 & 4 & 2 \\
4 & 6 & 16 & 36 & 24 \\
3 & 11 & 9 & 121 & 33 \\
5 & 6 & 25 & 36 & 30 \\
8 & 12 & 64 & 144 & 96 \\
\\
\overline{4.2} & \overline{7.4} & \overline{23.} & \overline{68.2} & \overline{37.}
\end{pmatrix}$$

*** **3.** $\hat{\sigma}_y$ (equal to $\sqrt{\overline{y^2} - \overline{y}^2}$) is 3.666. What is $\hat{\sigma}_x$?

a) 2.315 b) 1.425 c) 1.479   d) 2.105   e) 1.668

*** **6.** r[x, y] (equal to $\dfrac{\overline{xy} - \overline{x}\,\overline{y}}{\hat{\sigma}_x \hat{\sigma}_y}$)

a) 0.84   b) 0.99   c) 0.80   d) 0.70   e) 0.91
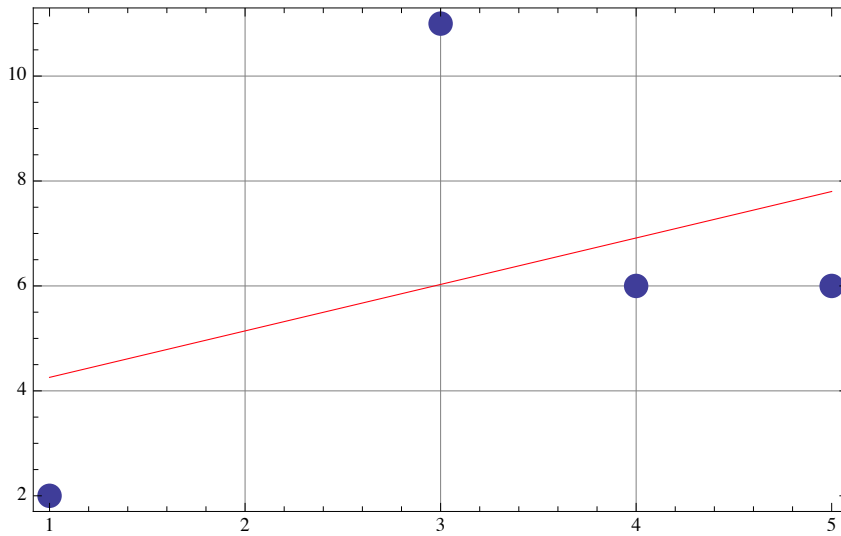

*** **7.** r[3x+2, 4y-10]

a) r[x, y] + 12   b) r[x, y]   c) r[x, y] + 18   d) 12 r[x, y]   e) 12 r[x, y] + 18

*** **11.**   Applicable df if population is 2D normal (or if, more generally, the normal errors model applies)

a) 4   b) 2   c) 3   d) 5   e) 1

14-16. Answer questions about the data with its L.S. fit.

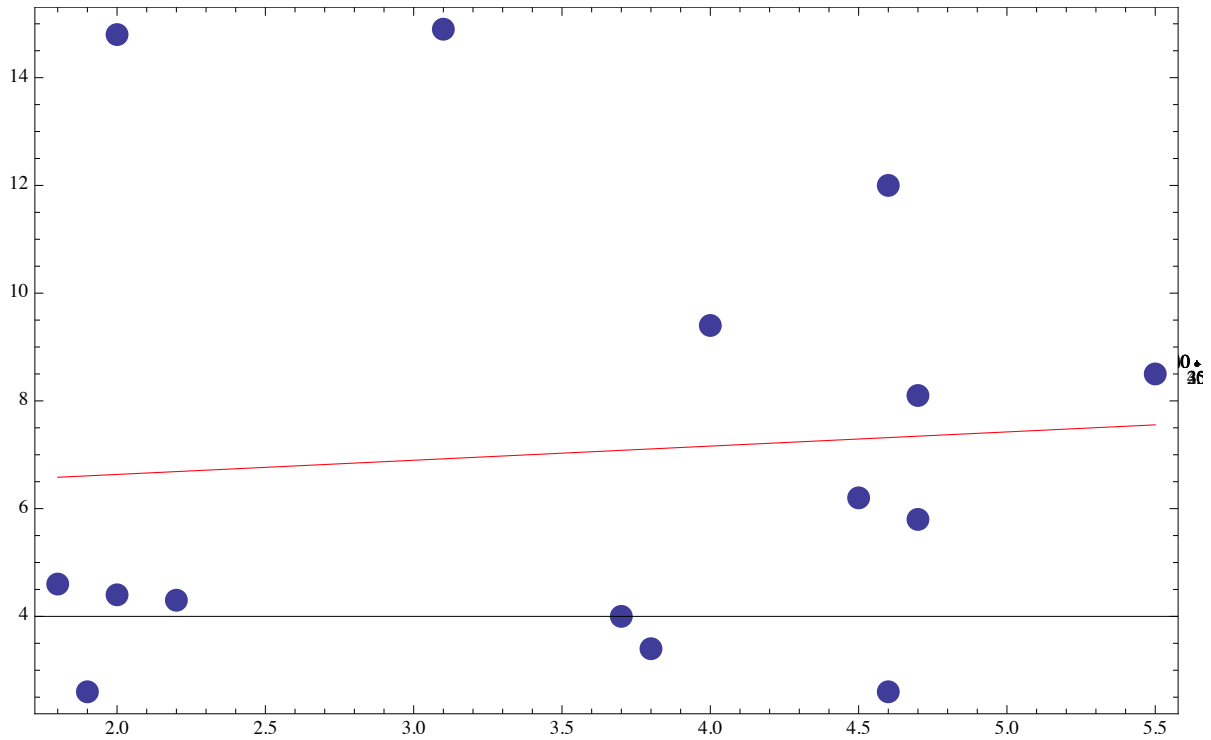*** **15.** b_1 (closest value, by eye)

a) 8/7　b) 2/6　c) 1.0　d) 6/5　e) 9/4
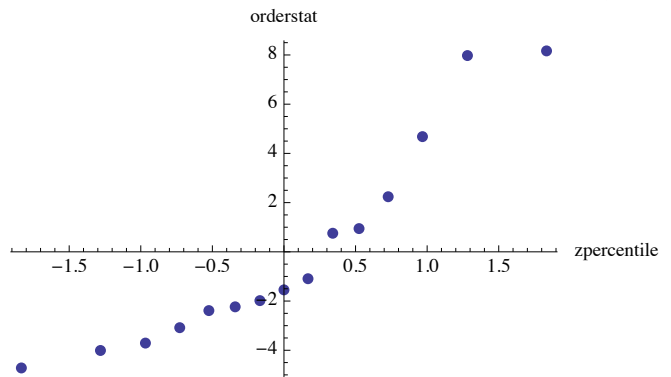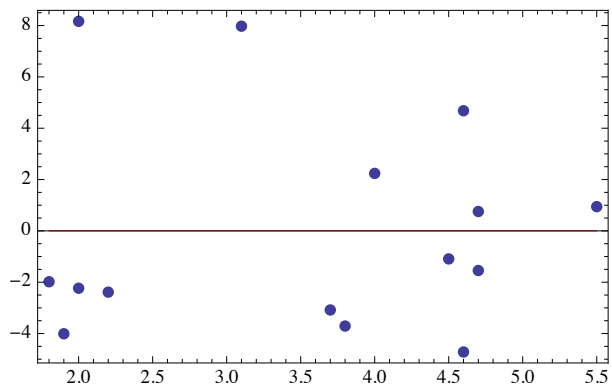
17-20. Here is a data plot
　　x = time at table
　　y = calories consumed
together with regression statistics. Also shown are a plot of the residuals versus x (left plot) and a normal probability plot of the residuals (right plot).


```
regrstats[x_, y_] := {mean[x], mean[y], s[x],   s[y],   r[x, y],   b₁}
```

```
regrstats[x_, y_] := {mean[x], mean[y], s[x],    s[y],     r[x, y],    b₁}
                        3.54        7.04   1.26649   4.14053    0.0804465  0.263003}
```
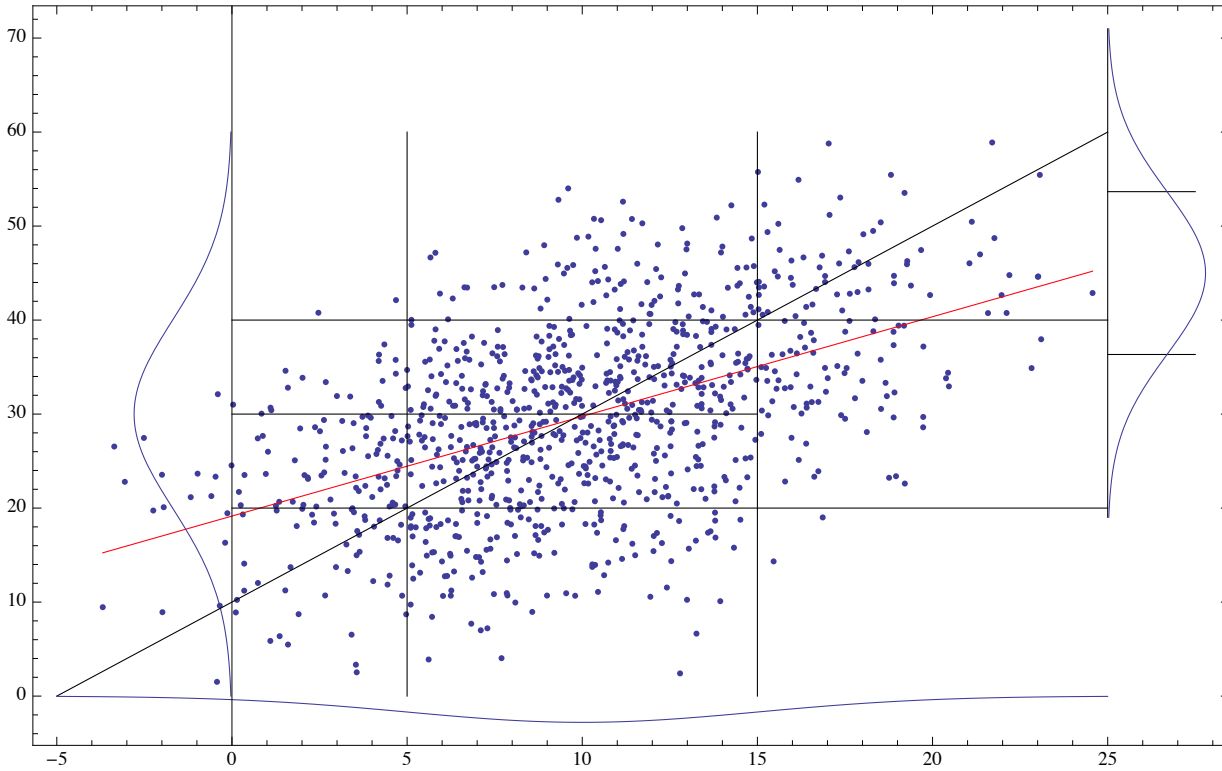

*** 17. Would you agree that the plots strongly confirm normal errors?

a) only right does   b) neither   c) only left does   d) both do
                         the sample variance of y

$$\sqrt{1-(-0.26)^2}$$ 0.8

$(-0.8)^2$ $\sqrt{1-(-0.8)^2}$

*** **18.** What fraction of the sample variance of y is explained by L.S. fit of y on x?

a) $\sqrt{1-(-0.26)^2}$ b) 0.8   c) 1-(-0.8)

d) $(-0.8)^2$ e) $\sqrt{1-(-0.8)^2}$

21-23. Read off the requested **population** quantities from the **population** fit show below.

*** **21.** ρ

a) 0.5   b) 0.9   c) 0.2   d) 0.4   e) 0.75

*** **23.** L.S. prediction of y for x = 20.

$$\sqrt{1-\rho} \qquad\qquad \sqrt{1-\rho} \qquad \sqrt{1-\rho^2} \qquad\qquad \sqrt{1-\rho^2}$$

$s_X \qquad \overline{X}$

a) 70   b) 40   c) 30   d) 60   e) 50

*** **25.** SD of all y with x = 20.

a) $10\sqrt{1-\rho}$ b) 10 c) $\sqrt{1-\rho}$ d) $\sqrt{1-\rho^2}$ e) $10\sqrt{1-\rho^2}$

26-32. (a) True or (b) False?

*** **28.** Galton's plot of pairs x = parental sweet pea size, y = filial sweet pea size for for equal numbers of parent seeds selected at each of x = 0, ±1, ±2, ± 3 units of s_x from $\overline{x}$, the plot appeared elliptical.

*** **32.** Galton's regression effect implies that, owing to the 2D normality of the plot, sons of fathers scoring 2 standard deviatioons above average height for fathers will on average be only (2 r) standard deviations above average height for sons.