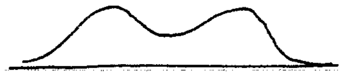
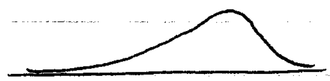
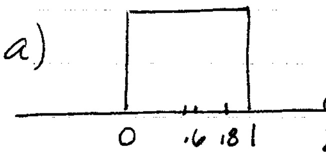
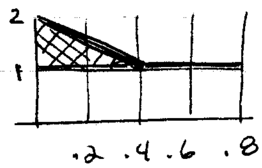
AP Stats 2.1 – 4, 6 – 9

$\boxed{2.1}$ Many possibilities  symmetric

skewed left 

$\boxed{2.2}$ a) 

20% are above .8
60% are below .6
50% are between .25 and .75

$\boxed{2.3}$ 

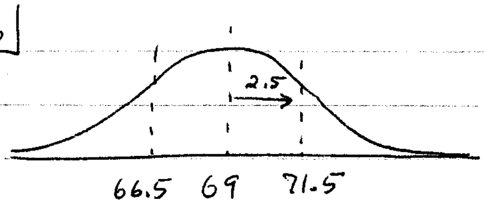
area of ▲ $= \frac{1}{2}(.4)(1) = .2$
area of each □ $= .2$

$= \frac{1}{2}(.2)(.5) = .05$
so $= .2 - .05 = .15$

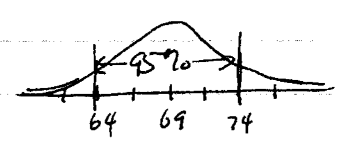
a) $0.6 \le X \le 0.8 \Rightarrow 0.2$
b) $0 \le X \le 0.4 \Rightarrow .2 + .2 + .2 = .6$
c) $0 \le X \le 0.8 \Rightarrow 1$
d) $0 \le X \le 0.2 \Rightarrow \quad .15 + .2 = .35$

$\boxed{2.4}$

	a)	b)	c)
mean	C	A	A
median	B	A	B

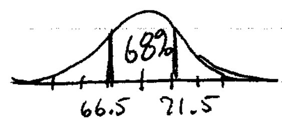
$\boxed{2.6}$ 

$\boxed{2.7}$ a) $69 + 2(2.5) = 74$ (2 st. dev. above mean)



2.5% above 74

b) $69 \pm 5 \Rightarrow 64$ to 74 inches
c) $66.5 = 69 - 2.5$ (one st. dev.)

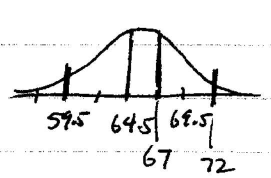


$100 - 68 = 32$
$\frac{1}{2}(32) = \boxed{16\%}$

d) $71.5 = 69 + 2.5$ (one st. dev.)
above 71.5 is 16% so below is
$100 - 16 = 84\%$

$\boxed{2.8}$ $\mu = 110$, $\sigma = 25$
a) 50% above 110

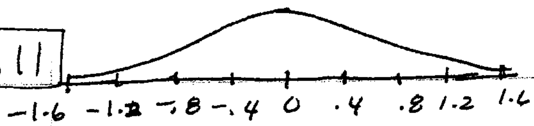
b) $160 = 110 + 20$
2.5%
c) 95% between
$110 \pm 25(2)$
60 to 160

$\boxed{2.9}$ $\mu = 64.5$
$\sigma = 2.5$


a) $64.5 \Rightarrow 50^{th}$
b) $59.5 \Rightarrow 2.5^{th}$
$\frac{1}{2}(100 - 95)$
c) $67 \Rightarrow 84^{th}$ $(100 - 16)$
d) $72 \Rightarrow 99.85^{th}$
$100 - \frac{1}{2}(100 - 99.7)$

AP Stats 2.11, 18, 20, 22, 23

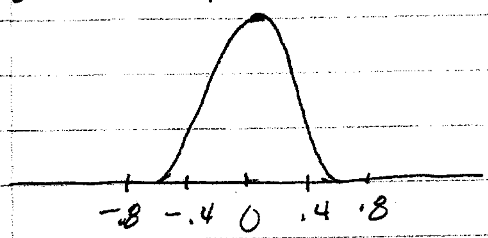
$\boxed{2.11}$



3σ takes us out to almost 1.6

Approximate σ by $3\sigma = 1.5$

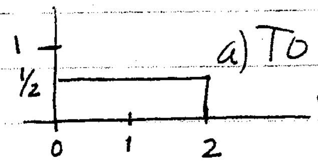
$\sigma = .5$



3σ takes us out to about 0.6

$3\sigma = 0.6$ so $\sigma \approx 0.2$

$\boxed{2.18}$



a) To make the area = 1 with length = 2 the height must be ½.

b) 50% of the area is to the left of 1

c) $M = 1$, $Q_1 = 0.5$ $Q_3 = 1.5$

d) between 0.5 and 1.3 is 0.8 unit (1.3 − 0.5)

so $P(0.5 < X < 1.3) = (0.8)(\tfrac{1}{2}) = 0.4$

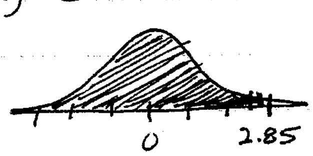
$\boxed{2.20}$ $X_1 = 680$ $N(500, 100)$ $z_1 = \dfrac{680-500}{100} = 1.8$ Eleanor

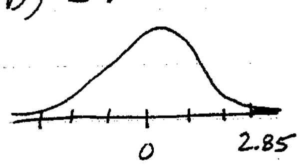
$X_2 = 27$ $N(18, 6)$ $z_2 = \dfrac{27-18}{6} = 1.5$ Gerald

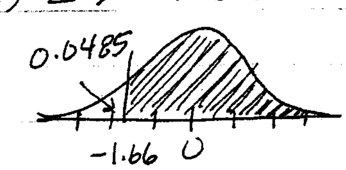
Eleanor's score is higher.

pg 92

$\boxed{2.22}$ a) $z < 2.85$ b) $z > 2.85$ c) $z > -1.66$

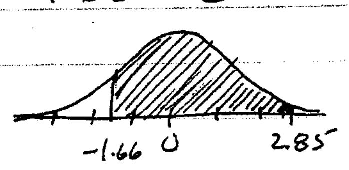






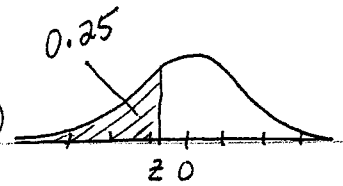
0.9978 $1 - 0.9978 = 0.0022$ $1 - 0.0485 = 0.9515$

d) $-1.66 < z < 2.85$



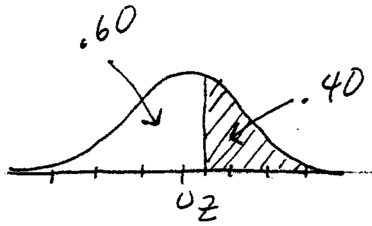
$0.9978 - 0.0485 = 0.9493$

$\boxed{2.23}$ a)



$z \approx -0.675$
(between $-.67$ and $-.68$)

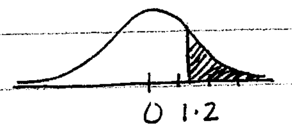
b)



$z \approx 0.25$

AP Stats 2.24 — 32

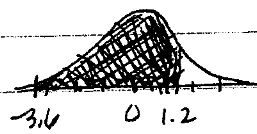
$\boxed{2.24}$ $N(69, 2.5)$ a) $P(x > 72) = P\left(z > \frac{72-69}{2.5}\right) = P(z > 1.2)$



$= 1 - .8849 = \boxed{0.1151}$

$\boxed{11.51\%}$

b) $P(60 < X < 72) = P\left(\frac{60-69}{2.5} < z < \frac{72-69}{2.5}\right)$

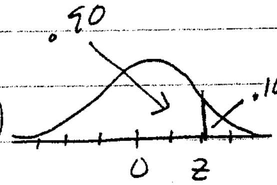


$= P(-3.6 < z < 1.2)$

$= 0.8849$ $\boxed{88.49\%}$

Area left of -3.6 is essentially zero

c)



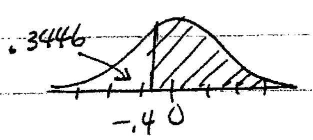
$z \approx 1.28$ $\quad 1.28 = \frac{X-69}{2.5}$

$(2.5)(1.28) = X - 69$

$3.2 + 69 = X$

$X = 72.2$ $\boxed{72.2 \text{ inches}}$

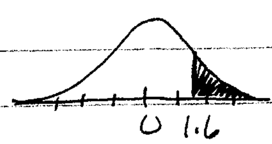
$\boxed{2.25}$ $N(110, 25)$ a) $P(X > 100) = P\left(z > \frac{100-110}{25}\right)$



$= P(z > -.4) = 1 - .3446 = 0.6554$

$\boxed{65.54\%}$

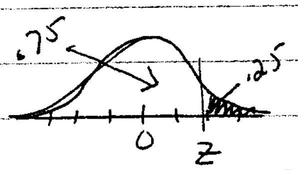
b) $P(X > 150) = P\left(z > \frac{150-110}{25}\right)$



$P(z > 1.6) = 1 - .9452 = .0548$

$\boxed{5.48\%}$

c)



$z \approx .675$ $\quad .675 = \frac{X-110}{25}$

$X = 126.875$

$\boxed{\text{score } 127}$

2.26

48	8
49	
50	7
51	0
52	6799
53	04469
54	2467
55	03578
56	12358
57	59
58	5
59	

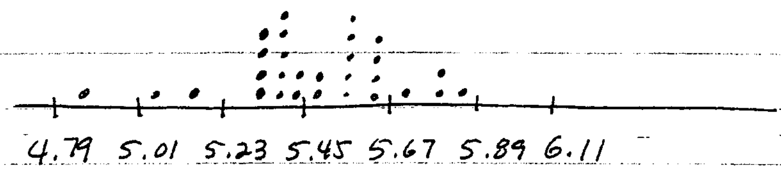
Ⓒ Ⓑ Ⓐ

$\bar{x} = 5.4479 \quad s = .2209$

Ⓐ $\bar{x} + s = 5.6688 \quad \bar{x} - s = 5.227$

Ⓑ $\bar{x} + 2s = 5.8897 \quad \bar{x} - 2s = 5.0061$

Ⓒ $\bar{x} + 3s = 6.1106 \quad \bar{x} - 3s = 4.7852$

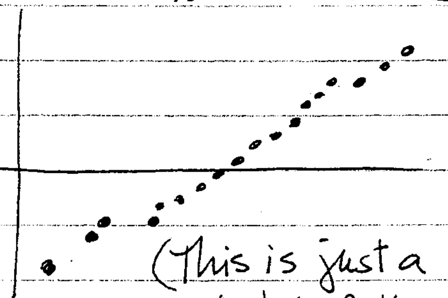


$\bar{x} \pm \sigma$ — $\bar{x}$ — 22 — $22/29 = 75.9\%$

$\bar{x} \pm 2\sigma$ — 28 — $28/29 = 96.6\%$

$\bar{x} \pm 3\sigma$ — 29 — $29/29 = 100\%$

b)



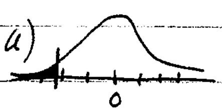
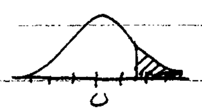
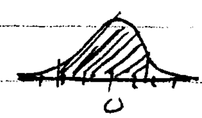
(This is just a sketch of the plot)

Because the probability plot shows a fairly linear pattern we expect the distribution to be approximately normal.

2.27 Cobb $z = \dfrac{.420 - .266}{.0371}$ Williams $\dfrac{.406 - .267}{.0326}$ Brett $\dfrac{.390 - .261}{.0317}$

$z = 4.15 \qquad z = 4.26 \qquad z = 4.07$

Williams' z-score is the highest.

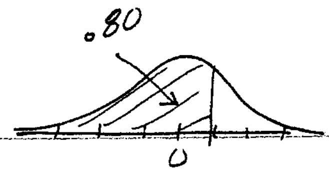
2.28 a)  b)  c)  d) 

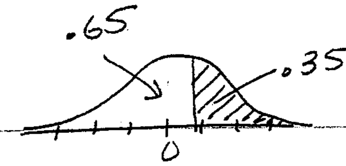
$P(z \le -2.25) = \boxed{.0122}$

$P(z \ge -2.25) = 1 - .0122 = \boxed{.9878}$

$P(z > 1.77) = 1 - .9616 = \boxed{.0384}$

$P(-2.25 < z < 1.77)$ $.9616 - .01\ldots = \boxed{.9494}$

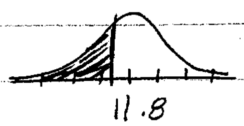
$\boxed{2.29}$ a) 

b) 

$z \approx 0.84$ $\qquad$ $z \approx .385$ (between .38 and .39)

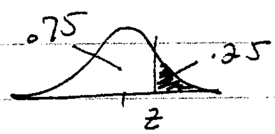
$\boxed{2.30}$ $N(11.8\%, 16.6\%)$

a) 95% fall within $\bar{x} \pm 2\sigma$ $\quad 11.8 \pm 2(16.6) = \boxed{-21.4 \text{ to } 45\%}$

b) 

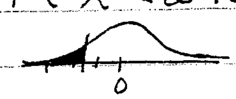
$P(X<0) = P\left(z < \frac{0-11.8}{16.6}\right)$

$= P(z < -.71) = .2389 \quad \boxed{23.9\%}$

c) 

$z \approx .675 \qquad .675 = \frac{X-11.8}{16.6} \qquad X \approx \boxed{23\%}$

$\boxed{2.31}$ $N(266, 16)$ a) $P(X<240) = P\left(z < \frac{240-266}{16}\right) = P(z < -1.625)$

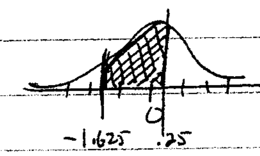


$= .0521$

$\boxed{5.21\%}$

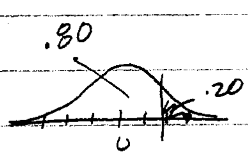
b) $P(240 < X < 270) = P\left(-1.625 < z < \frac{270-266}{16}\right)$

$= P(-1.625 < z < .25)$



$= .5987 - .0521 = .5466$

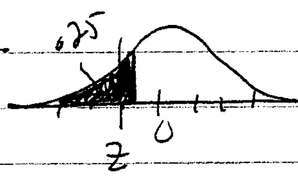
$\boxed{54.7\%}$

c) 

$.84 = \frac{X-266}{16}$

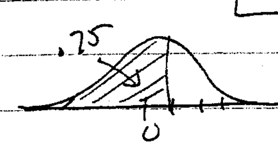
$z = .84$

$X = 279.44 \quad \boxed{\text{about 279 days}}$

$\boxed{2.32}$ 

Q_1

$z \approx -.675$



Q_3

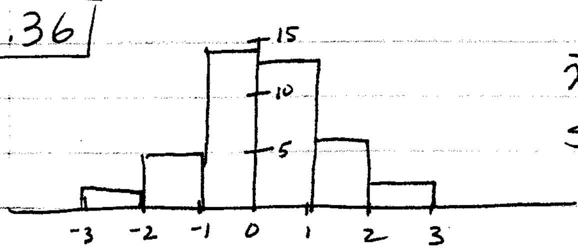
$z \approx .675$

$-.675 = \frac{X-266}{16} \qquad .675 = \frac{X-266}{16}$

$\boxed{255.2 = X} \qquad \boxed{276.8 = X}$

AP Stats 2.36, 37, 40, 41, 43

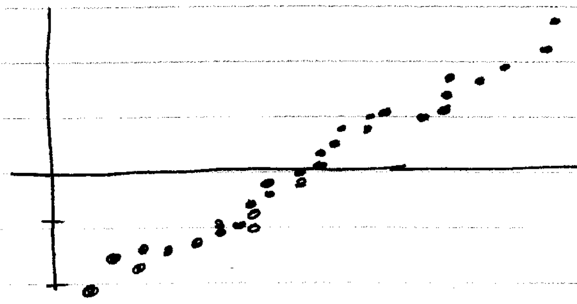
2.36



$\bar{x} = -4.146 \times 10^{-15} \approx 0$

$s = 1$

2.37



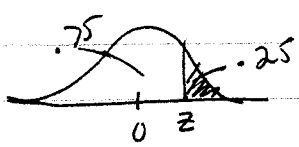
The normal probability plot shows a strong linear trend. The presidents' ages are approximately normally distributed.

2.40 $N(25, 5)$

a) $P(x < 20) = P\left(z < \frac{20-25}{5}\right) = P(z < -1) = \boxed{.1587}$

b) $P(x < 10) = P\left(z < \frac{10-25}{5}\right) = P(z < -3) = \boxed{.0013}$

c) $P(x > 35) = P\left(z > \frac{35-25}{5}\right) = P(z > 2) = 1 - .9772$
$= \boxed{.0228}$

d)


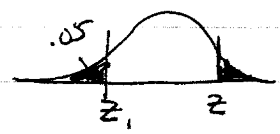
$z \approx .675$ so $.675 = \frac{x-25}{5}$

$x = \boxed{28.375}$

2.41 $N(100, 15)$ $P(x > 135) = P\left(z > \frac{135-100}{15}\right) = P(z > 2.33)$
$= 1 - .9901$
$= .0099$

So $(.0099)(1300) = 12.87$ about 13 are gifted.

2.43 $N(22.8, 1.1)$



$z_1 \approx -1.645$

$-1.645 = \frac{x - 22.8}{1.1}$

$x \approx 20.9905$

$x = 22.8 \pm 1.8095$

$x \approx 20.99$ or $x \approx 24.61$

Heads smaller than 21" or larger than 24.6" get custom helmets