SAMPLE FINAL 1 – PART B

1.

FIRST HAT

SECOND HA		G(.4)	S(.1)	C(.5)
	G(.3)	GG	SG	CG
	S(.6)	GS	SS	CS
	C(.1)	GC	SC	CC

(a)

Outcomes	GG	SG	CG	GS	SS	CS	GC	SC	CC
Probabilities	.4×.3 .12	.1×.3 .03	.5×.3 .15	.24	.06	.30	.04	.01	.05

(b) $P(\text{same colour}) = P(GG) + P(SS) + P(CC)$

$= .12 + .06 + .05$

$= .23$

.23 probability that the coins are the same colour.

(c) X = number of gold coins = 0, 1, 2

$P(X=0) = P(SS) + P(SC) + P(CS) + P(CC)$

$= .06 + .30 + .01 + .05 = .42$

$P(X=1) = P(SG) + P(CG) + P(GS) + P(GC)$

$= .03 + .15 + .24 + .04 = .46$

$P(X=2) = P(GG) = .12$

Value of X	0	1	2
Probability	.42	.46	.12

2. (a) $\mu = 37.0$ °C think it is <u>less</u> $\rightarrow \mu < 37.0$

$n = 27$

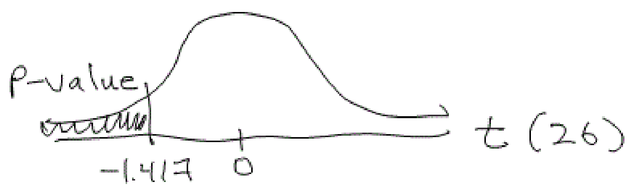
$\bar{x} = 36.85$ °C , $s = 0.55$ °C

$H_0: \mu = 37.0$ °C vs $H_a: \mu < 37.0$ °C

t has $df = n-1 = 26$

test statistic $= t = \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}} = \dfrac{36.85 - 37.0}{0.55/\sqrt{27}}$

$t = -1.417$



P-value is between .05 and .10

$\alpha = 1\%$ $\rightarrow$ Do not reject H_0

We are not convinced that the average body temperature is less than 37.0 °C. There is not enough evidence to confirm the physician's suspicion.

(b) Assuming the average body temperature of healthy adults is 37.0 °C, there is between .05 and .10 probability that our test statistic would be -1.417 or less. [The probability our sample would have a mean of 36.85°C or less.]

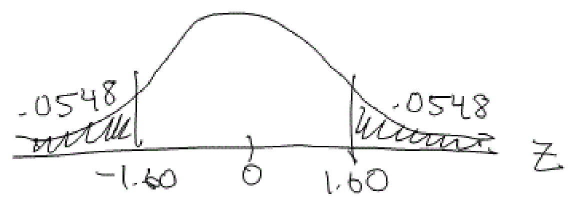
3. $p = 70\%$ $\quad n = 150,\ x = 114 \rightarrow \hat{p} = \frac{x}{n} = \frac{114}{150} = .76$

Is new <u>different</u>? 2-tailed

$H_0: p = 70\% = .7$ vs $H_a: p \neq 70\%$

test statistic $= z = \dfrac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \dfrac{.76 - .7}{\sqrt{\frac{.7(1-.7)}{150}}}$

$z = 1.60$

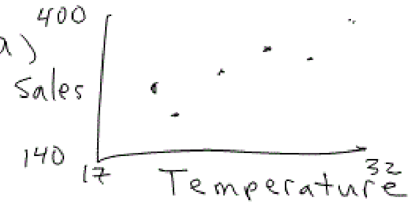


P-value $= .0548 \times 2 = .1096 = 10.96\%$

$\alpha = 10\%$ $\qquad$ Do <u>not</u> reject H_0

$\boxed{\text{There is no convincing evidence of a difference in effectiveness.}}$

4. (a)



There is a strong positive linear association between Sales and Temperature.

As the temperature rises, the ice cream sales also rise in a linear fashion.

(b) $\hat{y} = -232.03 + 22.58x$

intercept slope

In general, slope is how much y rises as x runs by ones.

x = Temperature in °C
y = Sales in dollars

For each degree Celsius the temperature rises, we predict ice cream sales will increase by 22.58 dollars.

(c) Residual $= y - \hat{y}$

Day 5 → given $x = 28$ °C, $y = \$340$

$\hat{y} = -232.03 + 22.58(28) = \$400.21$

Residual $= y - \hat{y} = 340 - 400.21 = -60.21$

The residual is −60.21 dollars

(d) $r^2 = (.88)^2 = \boxed{.7744}$