(1) $H_0: P_1 = P_2$

claim → $H_1: P_1 > P_2$

$\alpha = 0.05$ (OUR CHOICE)

✓ Claim
✓ Data
✓ α
✓ TS
✓ PV
✓ CON

DATA

OLDER	YOUNGER
$n_1 = 2{,}107$	$n_2 = 2{,}216$
$x_1 = 1{,}075$	$x_2 = 1{,}064$
$\hat{p}_1 = \frac{1075}{2107}$	$\hat{p}_2 = \frac{1064}{2216}$
$\hat{p}_1 \approx 0.510$	$\hat{p}_2 \approx 0.480$

$\bar{p} = \frac{1075 + 1064}{2107 + 2216} \approx 0.495$

$\bar{q} \approx 0.505$

TEST STATISTIC

$$Z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\frac{\bar{p}\bar{q}}{n_1} + \frac{\bar{p}\bar{q}}{n_2}}} \qquad Z = \frac{(.51 - .48) - 0}{\sqrt{\frac{(.495)(.505)}{2107} + \frac{(.495)(.505)}{2216}}} \approx \boxed{1.976}$$

P-value $\approx$ $\boxed{0.024}$ $\boxed{\text{REJECT } H_0}$

There is sufficient evidence to support the claim that the proportion of older Americans saying yes is higher than the proportion of younger Americans.

90% CI : (.005, .055)

Since the interval for $(P_1 - P_2)$ does NOT contain zero we should REJECT H_0.

(2)

✓ Claim
✓ Data
✓ α
✓ TS
✓ PV
✓ con

claim → H_0: Number of cavities is INDEPENDENT of WATER supply
H_1: Number of cavities DEPENDS on water supply

$\alpha = 0.01$

DATA

CAVITIES	FLOUIDATED TOWN	NON-FLOORIDATED TOWN
0	154 / 143.5	133 / 143.5
1	20 / 19	18 / 19
2	14 / 17.5	21 / 17.5
3 or more	12 / 20	28 / 20

(EXPECTED VALUES written diagonally)

TEST STATISTIC

$$\chi^2 = \sum \frac{(O-E)^2}{E} \qquad \chi^2 = \frac{(154-143.5)^2}{143.5} + \cdots + \frac{(28-20)^2}{20}$$

$$\chi^2 \approx \boxed{9.442}$$

$$\text{P-value} \approx \boxed{0.024}$$

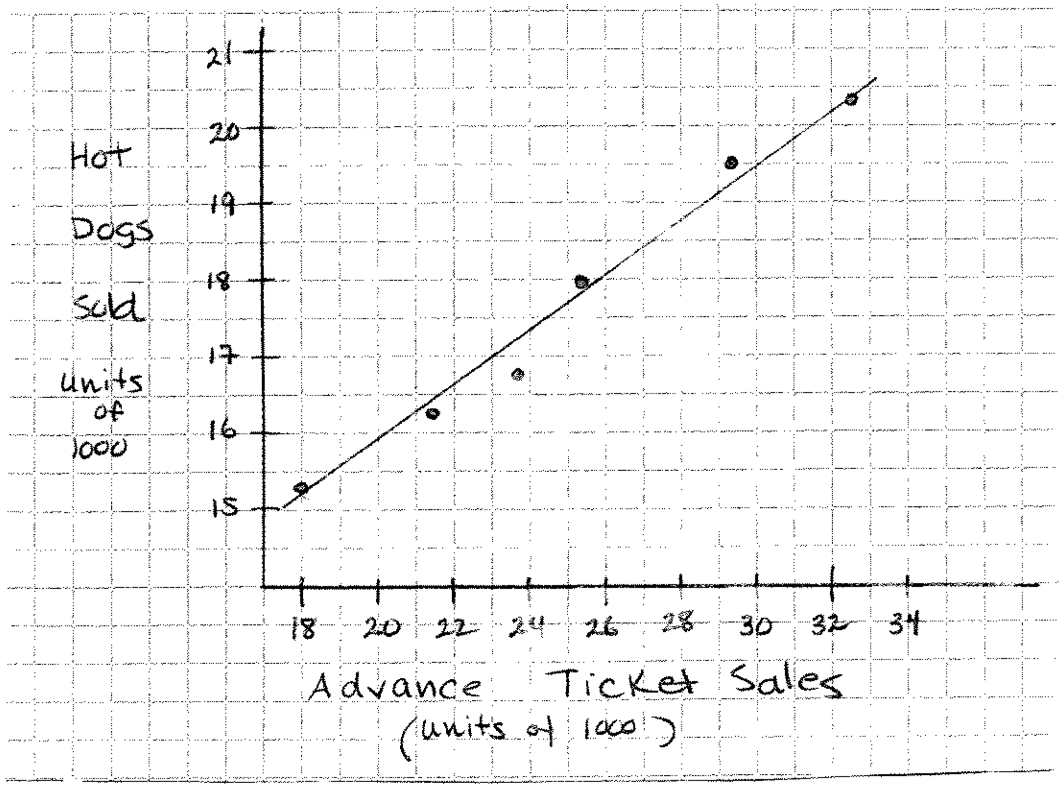
$\boxed{\text{Fail to Reject } H_0}$

There is insufficient evidence to reject the claim that the number of cavities is independent of whether that person's water supply is flouridated.

(3)

(a)

(e)



(b) $r \approx 0.9899$ P-Value ≈ 0.00015

(c) SIGNIFICANT POSITIVE LINEAR CORRELATION

(d) $\hat{y} \approx 8.41 + 0.37x$

(e) above (on scatter plot)

(f) $r^2 \approx 0.9799$ 97.99% of the variation in hot dogs sold can be explained by the variation in advance ticket sales.

(g) $\hat{y} \approx 8.41 + 0.37(26.0) \approx \boxed{18.0}$ (units of 1,000)

(h) 95% P.I. CV: 2.776 $x_0 = 26.0$ $\boxed{(17.1, 19.0)}$

(UNITS of 1,000)

(4) claim → H_0 : $P_N = .35$, $P_S = .35$, $P_E = .15$, $P_W = .15$

H_1 : at least one proportion is NOT equal to the given proportions

$\alpha = 0.05$ (our choice)

✓ Claim
✓ Data
✓ α
✓ TS
✓ PV
✓ CON

DATA

$n = 400$

REGION	NORTH	SOUTH	EAST	WEST
OBSERVED:	106	138	76	80
EXPECTED:	140	140	60	60

TEST STATISTIC

$$\chi^2 = \sum \frac{(O-E)^2}{E} \quad \chi^2 = \frac{(106-140)^2}{140} + \cdots + \frac{(80-60)^2}{60}$$

$$\chi^2 \approx \boxed{19.219}$$

$$\text{P-Value} \approx \boxed{0.00025}$$

$\boxed{\text{REJECT } H_0}$

There is SUFFICIENT evidence to reject the claim that mail-order sales are likely to occur in four regions with the proportions - NORTH 35%, SOUTH 35%, EAST 15%, WEST 15%.

(5) $H_0: \mu_d = 0$

claim → $H_1: \mu_d > 0$

$\alpha = 0.05$

✓ Claim
✓ Data
✓ α
✓ TS
✓ PV
✓ CON

DATA

	A	B	C	D	E	F	G	H	I	J	K	L
Before :	73	67	68	60	76	80	73	77	66	58	82	78
After :	77	69	73	70	74	88	76	82	69	61	84	80
Difference:	4	2	5	10	-2	8	3	5	3	3	2	2

$n = 12$, $\bar{d} = 3.75$, $S_d \approx 3.08$

TEST STATISTIC

$$t = \frac{\bar{d} - \mu_d}{\frac{S_d}{\sqrt{n}}} \qquad t = \frac{3.75 - 0}{\frac{3.08}{\sqrt{12}}} \approx \boxed{4.22}$$

P-value $\approx \boxed{0.0007}$

$\boxed{\text{REJECT } H_0}$

There is sufficient evidence to support the claim that chewing tobacco increases resting heart rate.

(6) claim → $H_0: \mu_1 = \mu_2 = \mu_3$

H_1 : at least one mean is NOT equal

$\alpha = 0.01$

✓ Claim
✓ Data
✓ α
✓ TS
✓ PV
✓ CON

TEST STATISTIC

$$F = \frac{\frac{SS\ FACTOR}{df}}{\frac{SS\ Error}{df}} = \frac{MS\ Factor}{MS\ Error}$$

$$F \approx \frac{\frac{28.1667}{2}}{\frac{20.75}{9}} \approx \frac{14.083}{2.306} \approx \boxed{6.108}$$

P-value $\approx \boxed{0.021}$

$\boxed{\text{Fail to Reject } H_0}$

There is NOT sufficient evidence to reject the claim that the means are the same for the

(7)

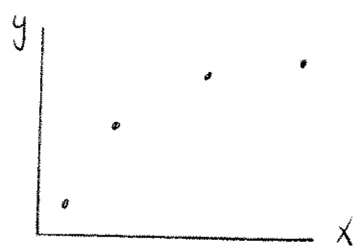
(a) $F = \dfrac{\frac{938}{2}}{\frac{10484}{37}} \approx \boxed{1.655}$

(b) $\bar{y} = 10.1$ (NO LINEAR CORRELATION)

(c) $t \approx \boxed{5.357}$ P-value ≈ 0.0000008 $\boxed{\text{REJECT } H_0}$

(d) $r \approx 0.894$ P-value ≈ 0.106 NO LINEAR CORRELATION

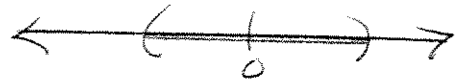
$r_s = 1$ PEFECT POSITIVE RANK CORRELATION



WE CAN SEE THAT A LINEAR RELATIONSHIP DOES NOT EXIST BUT A POSITIVE, NON-LINEAR RANK CORRELATION DOES EXIST.

(e) $r^2 = 0.64$ (64%)

(f) $(-0.017, 0.137)$



Interval DOES contain zero.

There is NOT sufficient evidence to support the claim that P_2 is greater than P_1.