HONORS PRECALC
CHAP 1 REVIEW (F2015)

NAME: MAYO

(1) GIVEN $\overset{d = 2\sqrt{2}}{-3\sqrt{2}, -\sqrt{2}}, \sqrt{2}, \ldots$

(A) WRITE AN EXPRESSION FOR a_n IN TERMS OF n, THE TERM NUMBER. $\boxed{-3\sqrt{2} + (n-1)2\sqrt{2}} = a_n$.

(B) CALCULATE a_{25}. $a_{25} = -3\sqrt{2} + (24)2\sqrt{2} = -3\sqrt{2} + 48\sqrt{2} = \boxed{45\sqrt{2}}$

(C) SOLVE FOR n IF $a_n = 19\sqrt{2}$.

$19\sqrt{2} = -3\sqrt{2} + (n-1)2\sqrt{2}$

$22\sqrt{2} = (n-1)2\sqrt{2} \longrightarrow 22 = 2n - 2$

$24 = 2n$

$n = 12$ 12

(2) WRITE THE FOLLOWING SERIES USING SIGMA NOTATION:

$\underbrace{-\frac{5}{2} + -\frac{3}{2}}_{+1} \underbrace{+ -\frac{1}{2}}_{+1} \underbrace{+ \frac{1}{2}}_{+1} \underbrace{+ \frac{3}{2}}_{+1}$

$\boxed{\sum_{n=1}^{5} \underbrace{-\frac{5}{2} + (n-1)}_{a_n}}$

(3) A NEW STADIUM HAS 24 ROWS OF SEATS IN THE UPPER LEVEL. THE FIRST ROW HAS 180 SEATS, THE SECOND HAS 184 SEATS, THE THIRD ROW HAS 188 SEATS AND THE PATTERN CONTINUES. CALCULATE THE SEATING CAPACITY OF THE UPPER LEVEL USING FORMULAS FROM THIS UNIT.

$S_{24} = \frac{24}{2}(a_1 + a_{24})$

$= \frac{24}{2}(180 + 272) = \boxed{5424 \text{ SEATS}}$

$a_{24} = 180 + 4(23)$

$= 272$

(4) HOW MANY TERMS OF THE SEQUENCE $\underbrace{-5, -1}_{+4}, \underbrace{3}_{+4}, \ldots$ MUST BE ADDED TO REACH A SUM OF 400?

$400 = \frac{n}{2}(-5 + a_n)$

$400 = \frac{n}{2}(-5 - 9 + 4n)$

$800 = n(-14 + 4n)$

$800 = -14n + 4n^2$

$4n^2 - 14n - 800 = 0 \longrightarrow$ CALC. TABLE $\boxed{n = 16}$

$a_n = -5 + 4(n-1)$

$= -5 + 4n - 4$

$= -9 + 4n$

(5) GIVEN THE GEOMETRIC SEQUENCE WITH $a_1 = 90$ AND $r = \frac{2}{3}$,

(A) FIND AN EXPLICIT EXPRESSION FOR a_n.

$$\boxed{a_n = 90\left(\tfrac{2}{3}\right)^{n-1}}$$

(B) CALCULATE a_8.

$$a_8 = 90\left(\tfrac{2}{3}\right)^{8-1} = \boxed{5.267489712}$$

(C) DOES THE ASSOCIATED GEOMETRIC SERIES CONVERGE OR DIVERGE? WHY? CONVERGE $r = \frac{2}{3}$ SO $|r| < 1$.

(D) IF THE SERIES ~~DIVERGES,~~ CONVERGES, WHAT DOES IT CONVERGE TO?

$$S = \frac{a_1}{1-r} = \frac{90}{1-\frac{2}{3}} = \frac{90}{1/3} = \boxed{270}$$

(6) FIND a_1 FOR THE GEOMETRIC SEQUENCE WITH $a_4 = 54$ AND $a_5 = 16.2$

$$r = \frac{16.2}{54} = 0.3$$

$$a_3 = \frac{54}{.3} = 180 \rightarrow a_2 = \frac{180}{.3} = 600 \longrightarrow a_1 = \frac{600}{.3} = \boxed{2000}$$

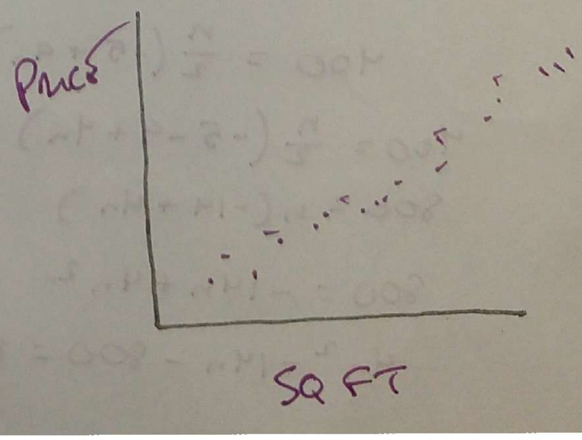
(7) EVALUATE $\sum_{j=1}^{\infty} 24\left(\frac{1}{2}\right)^j$ $\quad a_1 = 24\left(\frac{1}{2}\right)^1 = 12 \quad r = \frac{1}{2}$

$$S = \frac{12}{1-\frac{1}{2}} = \frac{12}{1/2} = 24$$

(8) Selma House is a local real estate agent, and based on recent sales in her neighborhood, she wants a linear model to use when pricing properties. The table below lists the square footage for each of the last 15 houses sold and the selling price for that house.

Square Feet	Selling Price	Square Feet	Selling Price
1000	\$122,000	2200	\$194,000
1200	\$140,000	2400	\$239,000
1400	\$132,000	2500	\$240,000
1500	\$158,000	2750	\$280,000
1600	\$169,000	3000	\$330,000
1850	\$160,000	3200	\$325,000
2000	\$185,000	3500	\$360,000
2150	\$208,000		

(A) SCATTER PLOT SELLING PRICE VS. SQ. FT. SKETCH GRAPH BELOW.



⑧ (CONT)

(B) DESCRIBE THE RELATIONSHIP BETWEEN PRICE AND SQ FT. (+) LINEAR REL. BETWEEN SQ FT + PRICE.

(C) FIND THE CORRELATION COEFFICIENT FOR PRICE AND SQ. FT. WHAT DOES THIS VALUE TELL YOU ABOUT THE RELATIONSHIP BETWEEN PRICE AND SQ. FT.?

$r = 0.9768$ STRONG (+) LINEAR RELATIONSHIP. BETWEEN PRICE + SQ FT.

(D) WRITE THE REGRESSION EQUATION.

$\hat{Y} = 100.448x + 171.057$

$\left.\begin{array}{l}\hat{Y} = \text{PRICE} \\ x = \text{SQ FT}\end{array}\right\}$ (\$K)

(E) INTERPRET SLOPE AND Y-INTERCEPT IN TERMS OF THE PROBLEM. FOR EACH ADD'L SQ FT OF SPACE, PRICE IS PREDICTED TO ↑ BY \$100.448. PREDICTED PRICE OF HOUSE w/o SQ FT IS \$171. (?) (PRICE OF LOT.)

(F) COMPUTE r^2 FOR YOUR REGRESSION MODEL. WHAT DOES THIS VALUE MEAN?

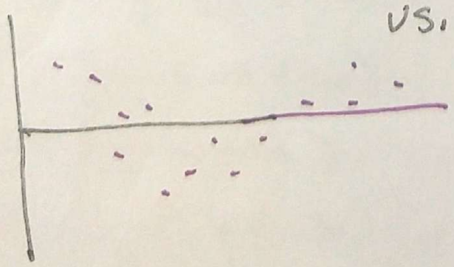
$r^2 = 0.95$

95% OF VAR IN HOUSE PRICE IS EXPLAINED BY VARIATION IN SIZE.

(G) CALCULATE A PREDICTED SELLING PRICE FOR A HOUSE WITH 2600 ft^2. IS THIS INTERPOLATION OR EXTRAPOLATION?

$\hat{Y}_1(2600) = \$261,334.74$

(H) MAKE A RESIDUAL PLOT AND SKETCH IT BELOW. WHAT DOES THIS PLOT MEAN ABOUT USING A LINEAR MODEL?



GENERALLY RANDOM + SCATTERED.

⟹ USE MODEL.