Rubax, a U.S. manufacturer of athletic shoes, estimates the following linear trend model for shoe sales :

Qt = a + bt + c1D1 + c2D2 + c3D3

Where

Qt= sales of athletic shoes in the *t*th quarter

T = 1,2, ….,28 [2004(I), 2004(II), …., 2010(IV)]

D1 = 1 if t is quarter I (winter); 0 otherwise

D2= 1 if it is t quarter II (spring); 0 otherwise

D3= 1 if t is quarter III (summer) 0 otherwise

The regression analysis produces the following results

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Dependent Variable | QT | R-Square | F-Ratio | P-Value on F |  |
| Observations | 28 | 0.9651 | 159.01 | 0.0001 |  |
| Variable | Parameter Estimate | Standard Error | T-Ratio | P-Value |  |
| Intercept | 184500 | 10310 | 17.9 | 0.0001 |  |
| T | 2100 | 340 | 6.18 | 0.0001 |  |
| D1 | 3280 | 1510 | 2.17 | 0.0404 |  |
| D2 | 6250 | 2220 | 2.82 | 0.0098 |  |
| D3 | 7010 | 1580 | 4.44 | 0.0002 |  |

a) is there sufficient statistical evidence of an upward trend in shoe sales?

b) Do these data indicate a statistically significant seasonal pattern of sales of Rubax shoes? If so, what is the seasonal pattern exhibited by the data?

c) Using the estimated forecast equation, forecast sales of Rubax shoes for 2011 (III) and 2012 (II).

d) how might you improve this forecast equation?