a) i) $FGPA = 2.442 + 0.063\,SATV + e$

   $b = 0.063$, $SE(b) = 0.028$, $p\text{-value} = 0.023$

   ii) As $n = 609$ is large, $t(n-h) = t(609-2) = t(607)$ distribution is very close to standard normal dist.

   95% conf. interval :

   $b \pm 2 \times SE(b) = 0.063 \pm 2 \times 0.028 = (0.007, 0.119)$

   $\downarrow$
   1.96

b) i) $FGPA = 1.557 + 0.014\,SATV + 0.173\,SATM + 0.200\,FEM + e$

   $b = 0.014$, $SE(b) = 0.028$, $p\text{-value} = \boxed{0.612}$

   ii) $b \pm 2 \times SE(b) = 0.014 \pm 2 \times 0.028 = (-0.042, 0.070)$

   includes zero
   $\rightarrow$ in line with

c) Total effect of SATV on FGPA = significant
  → incl. indirect effects due to SATM and gender

  partial effect of SATV on FGPA = not significant

  → after correction for indirect effects of SATM and gender

difference → suggests correlation between SATV, SATM, gender

	FGPA	SATV	SATM	FEM
FGPA	1	0.092	0.195	0.176
SATV		1	0.288	0.034
SATM			1	-0.163
FEM				1

→ if exclude SATM from the model FGPA
  → effect SATM is absorbed by SATV

d) i) Restricted model under H_0 is:

$$FGPA = \beta_1 + \beta_2 SATM + \beta_3 FEM + \varepsilon$$

OLS gives: $\qquad SSR_0 = e_0' e_0 = 118.151224$

$$R_0^2 = 0.082575$$

OLS unrestricted model part (b) gives:

$$SSR_1 = e_1' e_1 = 118.101025$$

$$R_1^2 = 0.082965$$

$g = 1$ $\qquad\qquad F(g, n-w) \Rightarrow F(1, 605)$ $\quad 5\% \ C.V. = 3.9$

$n = 609$

$k = 4$

$$F = \frac{(e_0' e_0 - e_1' e_1)/g}{e_1' e_1 / (n-w)} = \frac{(118.151224 - 118.101025)/1}{118.101025/605} = 0.257 < 3.9$$

$$F = \frac{(R_1^2 - R_0^2)/g}{(1 - R_1^2)/(n-w)} = \frac{(0.082965 - 0.082575)/1}{(1 - 0.082965)/605} = 0.257 < 3.9$$

$$\rightarrow H_0 \text{ not rejected}$$

d) ii) t-value for SATV in $(b-i) = 0.507105 \left(= b/SE(b) \right)$

$t^2 = 0.257 = F$ $(d-i)$