Question 3

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Part A

The odds of the adolescent having obtained condoms increased by a a factor of 4.04 for those adolescents who took part in an HIV educational program. The corresponding confidence interval was [1.17, 13.9], which does not contain 1, hence, there was a significant increase in the odds of an adolescent having obtained condoms if they took part in an HIV educational program.

Part B

$\hat{\beta}_1 = 1.3962447$ $\hat{\beta}_2 = 0.3220835$ $\hat{\beta}_3 = 1.7613003$ $\hat{\beta}_4 = 1.1693814$

Part C

We would need to know the probability of buying condoms when group, gender, SES and pifetime partners are all equal to 0.

Part D

Based on the corresponding Wald 95% confidence interval for the log odds ratio, the standard error for the `group` effect is 0.6313598.

Part E

Based on our confidence interval, the standard error for gender should be 0.5991594. however, if we try to reconstruct that confidence interval using the provided odds ratio, we get [0.4264555, 4.4656477], which doesn't match our provided confidence interval. However, if we use the provided 3.97 in the question as the odds ratio to reconstruct the confidence interval, we get [1.2283468, 12.8626888], which matches the provided confidence interval. Hence, the actual odds ratio should read 3.9749016.

Appendix

```
knitr::opts_chunk$set(echo = TRUE)
# part B
b1 = log(4.04)
b2 = log(1.38)
b3 = log(5.82)
b4 = log(3.22)

# part D
l = log(1.17)
u = log(13.9)

# Does b1 = (l + u) / 2?
m = (l + u) / 2 # Close enough

a = 0.05
z = qnorm(1 - (a / 2))

se1 = (m - l) / z
se2 = (u - m) / z  # double check

# reconstruct to triple check
ci = c(exp(b1 - (z * se1)), exp(b1 + (z * se2))) # noice

# part E
l2 = log(1.23)
u2 = log(12.88)

# Does b2 = (l2 + u2) / 2?
m2 = (l2 + u2) / 2 # Close enough

se12 = (m2 - l2) / z
se22 = (u2 - m2) / z  # double check

# reconstruct to triple check
ci2 = c(exp(b2 - (z * se12)), exp(b2 + (z * se22))) # not noice
ci3 = c(exp(exp(b2) - (z * se12)), exp(exp(b2) + (z * se22))) # ahhh much better
```