Midterm Preparatory Work Response

1 Section 1

Question 1.
The null hypothesis is that receiving deworming drugs does not affect student's health. The alternative hypothesis is that it does.

Question 2.

I would carry out a t-test for the difference in means. The binary independent variable is whether students received treatment and the response is the level of health. I would choose an alpha level of 0.05, which means that the p value of the test would have to be 0.05 or smaller, to reject the null hypothesis. Given that the sample is large enough, a t value more extreme than ± 1.96 would signify this.

Background information: The study was administered such that students who received treatment were in different schools than students who did not. This was done to minimize spillover effects. The study found large effects. See: Miguel and Kramer 2004. "Worms: Identifying Impacts on Education and Health in the Presence of Treatment Externalities". *Econometrica*, vol. 72, no. 1, pp. 159-217.

2 Section 2

Question 1.
Political Stability is continuous. The appropriate measure of central tendency is the mean. For dispersion, it is the standard deviation. Countries without a peacekeeping mission have mean stability 27.07 and standard deviation 18.27. Countries with peacekeepers have mean stability 46.73 and standard deviation 15.44.

Question 2.
The null hypothesis is that post-conflict countries with and without peacekeeping missions are similar in terms of political stability. The alternative hypothesis is that peacekeeping makes a difference with respect to political stability.

According to the numerical difference in means, countries with peacekeepers were more stable. The difference is -19.67.

Question 3.
A t-test for the difference in means was used to check whether countries with and without peace-

keepers differ in terms of political stability.

The computed t-value (-3.18) is more extreme than the critical value 2.05. That means that the estimated difference in political stability is less likely than 5% assuming that the null hypothesis—peacekeeping does not affect political stability—is true. Therefore, I reject the null hypothesis. This is evidence that peacekeeping facilitates political stability and hence state-building.

3 Section 3

Question 1.
People tend to compare themselves to the people living around them in their society. To observe that others have more may lead people to feel inferior of left behind when the gap grows. Furthermore, people will question the fairness of society. What is more, higher differences in terms of relative wealth lead to tensions that may manifest in terms of crime. Overall, we expect that higher inequality decreases the level of satisfaction in society.

As societies become richer in absolute terms, the quality of live tends to increase in the aggregate. Therefore, higher absolute wealth leads to more life satisfaction.

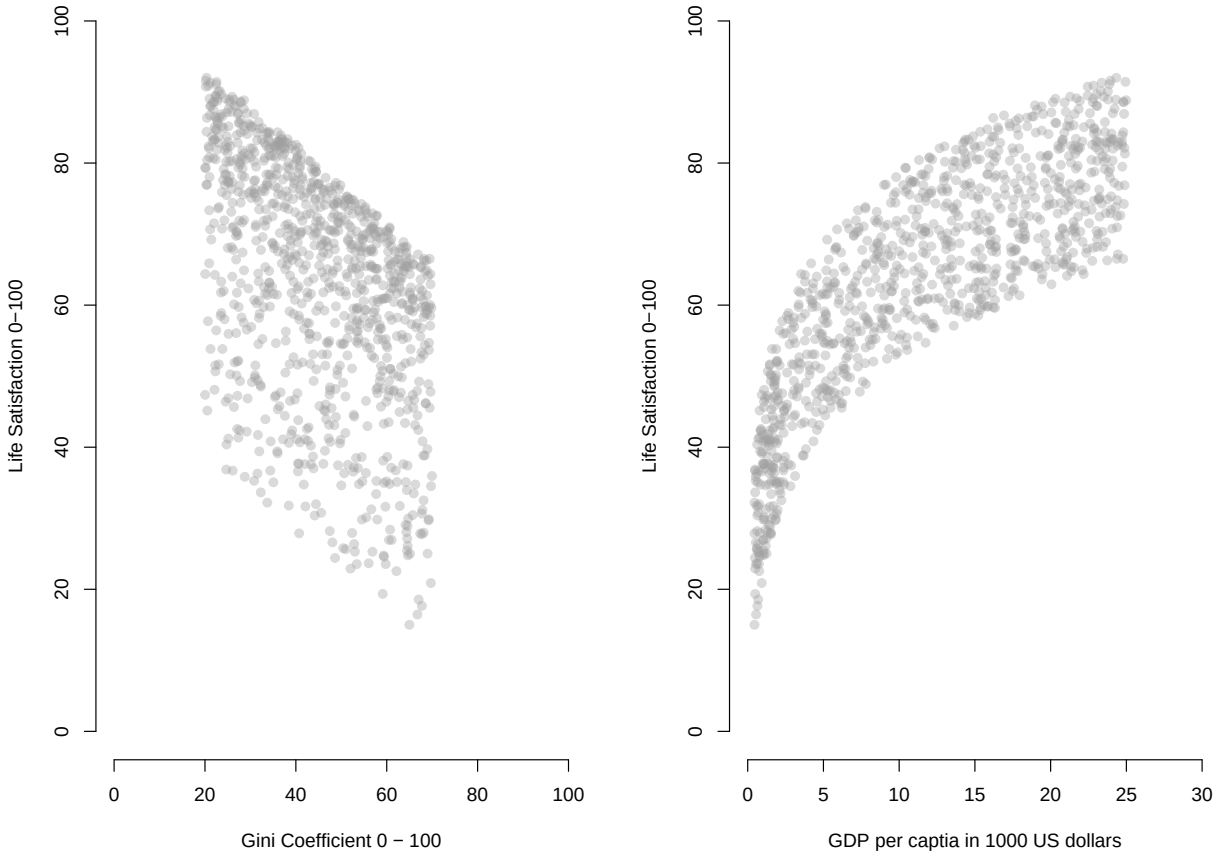
Question 2.
The first scatter plot in figure 1 shows the relationship between relative wealth and satisfaction with life. There seems to be a clear downward trend in happiness as inequality increases. In the second scatter plot, we see that as absolute wealth increases, life satisfaction tends to also increase. The increase seems to be more pronounced for poorer societies than for richer ones.

Question 3.
The high R^2 indicates that our model explains life satisfaction quite well, 90% of the variance of happiness is explained by our model. For both the gini coefficient and the GDP/captia, we reject the null hypothesis because both are more than two standard deviations form zero. The t value of the Gini coefficient is $t = -0.52/0.01 = -52$. The t value for GDP/captia is $1.74/0.02 = 87$. Both are, thus, significant at the 5% level.

The gini coefficient is negative. The negative sign implies that higher levels of inequality decrease happiness. An increase of 1 point in equality decreases happiness by 0.5 points. For absolute wealth, we predict that an additional \$1000 of GDP per capita increases happiness by 1.74 points.

Question 4.
Technically, the intercept implies that life satisfaction would be 66.26 if both GDP/capita and the gini coefficient were 0. However, such a case is purely hypothetical. It does not exist as our scatter plot with the gini coefficient clearly indicates.

Figure 1: Relationships of Life Satisfaction, Absolute Wealth & Relative Wealth



Question 5.
I would not provide an estimate for a gini coefficient of 85 because we do not have data for such a case. We do not extrapolate from our data because we would have to assume that the relationship remains the same which is seldom the case.

Question 6.
The relationship between absolute wealth and happiness does not appear to be linear and is, therefore, not well described by a line. In societies with low levels of absolute wealth the relationship seems to be very steep while the effect of wealth on happiness seems to level out in richer societies.

Note: We cover non-linearities in the coming sessions, you will not need to know this for the midterm.

Appendix

The r-code to reproduce the answers follows.

3.1 Section 2

Question 1.

```
# no peacekeepers
a <- c(58, 13, 41,  6, 30, 46,  1, 10,  7, 49, 23, 38, 46, 15, 23)
mean(a)
sd(a)


# peacekeepers
b <- c(63, 54, 45, 60, 22, 33, 30, 61, 63, 62, 33, 20, 52, 58, 45)
mean(b)
sd(b)
```

Question 2.

```
# numerical difference in means
mean(a) - mean(b)
```

Question 3.

```
# standard error of difference in means
se <- sqrt( (var(a) / length(a)) + (var(b) / length(b)) )
# t value
(mean(a) - mean(b)) / se
```

3.2 Section 2

Question 2.

```
# load econ data
load("econ_data.RData")

# to plot two plots next to each other
par(mfrow = c(1,2)) # plot window divided into 1 row and 2 columns

# scatter plot: satisfaction and gini
plot(satisfaction ~ gini, data = df, frame.plot = FALSE, ylim = c(0, 100),
 xlim = c(0,100), col = rgb(red = 160, blue = 160, green = 160, alpha = 100,
 maxColorValue = 255), pch = 19, xlab = "Gini Coefficient 0 - 100",
 ylab = "Life Satisfaction 0-100")

# scatter plot: satisfaction and gdp per capita
plot(satisfaction ~ gdp.capita, data =df, frame.plot = FALSE, ylim = c(0, 100),
 xlim = c(0,30), col = rgb(red = 160, blue = 160, green = 160, alpha = 100,
 maxColorValue = 255), pch = 19, xlab = "GDP per captia in 1000 US dollars",
 ylab = "Life Satisfaction 0-100")
```