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I pledge my Honor that I have abided by the Stevens Honor System. -Kush, Jo-Anne, Simerjeet

7.71

a) Yes, it is because we can see throughout the data sets, there are no outliers that can skew the graph. This allows for a fair test, we can see that there can also be a normal distribution performed over both samples.

b)

	sample size	mean	Standard deviation
Neutral	14	0.5714	ut0.7300459
Sad	17	2.117647	1.244104

c) μ_1 =neutral

μ_2 =sad

$H_0 \; -> \mu_1 = \mu_2$

$H_a \; -> \mu_1 \neq \mu_2$

d)

```
1  neutral=c(0,2,0,1,0.5,0,0.5,2,1,0,0,0,0,1)
2  sad=c(3,4,0.5,1,2.5,2,1.5,0,1,1.5,1.5,2.5,4,3,3.5,1,3.5)
```

```
> t.test(neutral,sad,alternative = ("two.side"), paired=FALSE, conf.level = 0.95)

        Welch Two Sample t-test

data:  neutral and sad
t = -4.3031, df = 26.48, p-value = 0.0002046
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -2.2841749 -0.8082621
sample estimates:
mean of x mean of y
0.5714286 2.1176471
```

Reject null hypothesis

e) (-2.2841749,-0.8082621)

7.89

a) μ_1 =Breast-fed

μ_2 =Formula

$H_0 \; -> \mu_1 = \mu_2$

$H_a \; -> \mu_1 > \mu_2$

$\frac{(13.3-12.4)}{\sqrt{\frac{1.7^2}{23}+\frac{1.8^2}{19}}}$=t value=1.66

```
> (1.7/23+1.8/19)^2/(((1.7/23)^2/(23-1))+((1.8/19)^2/(19-1)))
[1] 38.0791
```

```
> 1-pt(1.66,38,FALSE)
[1] 0.05257295
```

p-value = 0.053
From the given information we do not reject the null hypothesis

b) (-0.202, 2.002) df=38
(-0.243, 20434) df=19-1= 18

c) We can assume that these two variables are mutually exclusive. Each of these samples is also normally distributed and simply random (SRS).

7.102

Sample	n	s^2
1	11	3.5
2	16	9.1

a) Test Statistic $\rightarrow s_1^2/s_2^2 = \frac{9.1}{3.5} = 2.6$

b) p = 0.9343032

```
> pf(2.6,15,10)
[1] 0.9343032
```

c) Since $\alpha = 0.05$, and $p > \alpha$
We fail to reject H_0

7.122

a) Group 1:

```
> mean(x)
[1] 49.692
> var(x)
[1] 5.37264
```

Group 2:

```
> mean(y)
[1] 50.545
> var(y)
[1] 3.703161
```

```
        Two Sample t-test

data:  x and y
t = -0.89538, df = 18, p-value = 0.3824
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -2.854485  1.148485
sample estimates:
mean of x mean of y
   49.692    50.545
```

```
> z
 [1] -0.02 -2.03 -1.53 -2.95  1.18  0.00 -1.87  0.35 -1.16 -0.50
> mean(z)
[1] -0.853
> var(z)
[1] 1.610668
> t.test(z,alternative=c("two.sided"), var.equal=TRUE)

        One Sample t-test

data:  z
t = -2.1254, df = 9, p-value = 0.06248
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 -1.76087438  0.05487438
sample estimates:
mean of x
   -0.853
```

b)

c) The t value from part b is significantly less than the t value from part a. Additionally, the degrees of freedom have been halved from part a to b. The p value of part b is also significantly less than the value from part a.

8.71

a. The proportion of juvenile references for females: 48/60 = 0.8.
Standard error:

$$\sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{0.8(0.2)}{60}} = 0.00266$$

Males: 52/132 = 0.394
Standard error:

$$\sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{0.394(.606)}{132}} = 0.0018$$

b. 90% CI, $\sqrt{\frac{0.8(0.2)}{60} + \frac{0.394(.606)}{132}} = 0.06689$

$$(0.8 - 0.394) \pm 1.645 * 0.06689 = 0.406 \pm 0.11004 = (0.29596, 0.51604)$$

c.

```
> prop.test(x,n,alternative=c("two.sided"),conf.level = .90)

	2-sample test for equality of proportions with continuity
	correction

data:  x out of n
X-squared = 25.651, df = 1, p-value = 4.092e-07
alternative hypothesis: two.sided
90 percent confidence interval:
 0.2839014 0.5282198
sample estimates:
   prop 1    prop 2 
0.8000000 0.3939394 
```

P-value is extremely small, null hypothesis is rejected—the population proportions have a low chance of being equal to each other.