Youngberg

Econ 301—Bethany College

**Homework 04**

Answer all the following on a ***typed, stapled*** (if applicable)separate sheet of paper. You do not need to type equations and graphs. I charge 25 cents to staple your homework. Make sure that you justify your answers, use your own words, and show your work. All questions are equally weighted.

1. Construct an indifferent curve and budget constraint with Bars of Chocolate per Month on the Y axis and Bags of Marshmallows per Month on the X axis. Illustrate the effects of a ***decrease*** in the price of a ***bar of chocolate***. Illustrate what part of the change in ***bags of marshmallows*** is the income effect and what part of the change in ***bags of marshmallows*** is the substitution effect. ***Remember***: the change in price is for the Y axis; the indication of substitution and income effects references the X axis.

Bars of Chocolate/month

Bags of Marshmallows/month

Substitution Effect

Income Effect

1. Consider the following indifference curves. Indicate which ones are well behaved (which are convex and are downward sloping). Be sure to show your work.
	1. U = (XY)2
	2. U = 5X + 10Y
	3. U = X0.5 + Y0.5
	4. U = Y/X
2. *U0.5/X = Y*

*1st derivative: -U0.5/X2 √*

*2nd derivative: 2U0.5/X3 √*

1. *0.1U – 0.5X = Y*

*1st derivative: -0.5 √*

*2nd derivative: 0 —*

1. *(U – X0.5)2 = Y*

*1st derivative: 2(U – X0.5)(-0.5X-0.5)*

 *2(-0.5UX-0.5 + 0.5)*[[1]](#footnote-1)

 *1 – UX-0.5 √*

*2nd derivative: 0.5UX-1.5 √*

1. *UX = Y*

*1st derivative: U —*

*2nd derivative: 0 —*

*Only A and C are well behaved.*

1. Using the following indifference curve and prices, indicate the optimal number of X and Y the consumer should consume. (The indifference curve is well behaved; I have already checked for that.)

$$U= (X^{{1}/{3}})(Y^{{2}/{3}}) $$

PX = 2

PY = 3

I = 6

$$L = X^{⅓}Y^{⅔}- λ(2X + 3Y- 6)$$

$$\frac{∂L}{∂X} = ⅓X^{-⅔}Y^{⅔}- 2λ=0$$

$$\frac{∂L}{∂Y} = ⅔X^{⅓}Y^{-⅓}- 3λ=0$$

$$\frac{∂L}{∂λ} = -2X- 3Y+ 6=0$$

$$\frac{1}{6}\left(\frac{Y}{X}\right)^{⅔}= λ$$

$$\frac{2}{9}\left(\frac{X}{Y}\right)^{⅓}= λ$$

$$\frac{2}{9}\left(\frac{X}{Y}\right)^{⅓}= \frac{1}{6}\left(\frac{Y}{X}\right)^{⅔} $$

$$\frac{12}{9}= \frac{Y}{X}$$

$$\frac{4}{3}X= Y$$

$$2X+3\left(\frac{4}{3}\right)X=6$$

$$6X=6$$

**X = 1, Y = 4/3**

1. Calculate the following expected values:
	1. You get $15 if an even number is rolled on a 10-sided die.
	2. You get $1,000 if a “20” is rolled on a 20-sided die.
	3. You get $100 if a “12” ***or*** a “4” ***or*** a “10” is rolled on a 12-sided die.
	4. You get $1 equal to the value rolled on an 8-sided die (a “1” gets you $1, a “2” gets you $2, etc).
	5. You get $80 if a “12” is rolled on a 20-sided die ***and*** a “2” is rolled on a 4-sided die. (Both dice are rolled at the same time.)
2. *0.5($15) = $7.50*
3. *0.05($1,000) = $50*
4. *(1/12)($100) + (1/12)($100) + (1/12)($100) = $25*
5. *0.125($1) + 0.125($2) + 0.125($3) + 0.125($4) + 0.125($5) + 0.125($6) + 0.125($7) + 0.125($8) = $4.50*
6. *(0.05)(0.25)($90) = 0.0125($80) = $1*
7. For each of the following errors, indicate if it is Type I or Type II error. ***Briefly***,justify your result.
8. Presidential Candidate Mitt Romney says something wildly inaccurate about how much in taxes nearly half of Americans pay.
9. David buys batteries from Rite Aid only to find out they don’t work.
10. A publisher informs a prospective author that they will not publish his book which turns out to be a major success.
11. Sarah turns down Sebastian’s proposal for marriage even though Sebastian’s a great guy.
12. Because the Department of Defense automatically pays any shipping on any “high priority” item they buy, they are purposely overcharged for shipping by various customers.
13. *Type I. The null hypothesis is not to say anything, or at least not say something new. Turns out what he said wasn’t accurate—he should have failed to reject the null hypothesis and not say anything.*
14. *Type I. The null hypothesis of any potential purchase is to not buy it. David should have stuck with his default position.*
15. *Type II. Not publishing something is the default position for any publisher (just like not buying something is the default position for a customer). By sticking with the null hypothesis, the publisher is missing out on a great book.*
16. *Type II. Assuming Sarah isn’t the type of person who accepts marriage proposals automatically, she’s failing to reject her null hypothesis when she should reject her null and marry Sebastian.*
17. *Type I. If the default position of such items is to automatically pay shipping costs, and these costs are too high, the DoD should reject their null hypothesis and not pay for this shipping.*

*As a side note, this is a true story. C&D Distributors, who sold bolts, washers, and other minor hardware in the mid-2000s, discovered the DoD will automatically pay any shipping costs on anything that’s ordered as “high priority.” So they started charging the government outrageous shipping costs. How outrageous? In one instance, they sent the DoD two 19-cent washers…at a shipping cost of $998,798.*

<http://www.cnbc.com/id/35988310/>

<http://www.washingtonpost.com/wp-dyn/content/article/2007/08/16/AR2007081602230.html>

1. Recall that Xy times Xz equals Xy+z. [↑](#footnote-ref-1)