Assignment 3
HUL479
Algorithms in Ancient India

April 10, 2017

Instructions:

- Due date for submission: 20th April 2017.
- Attempt all questions.
- Numbers to the right of each question indicate the marks.

1. What is a Pratyāhāra? How many pratyāhāras are possible with the following 5 śivasūtras? List all of them. (5)
   - a i u Ṇ
   - ṛ ḷ K
   - e o Ṇ
   - ai au C
   - h y v r Ṭ
   - l Ṇ
2. Given the following sets,
   {d,e,f,g,h}, {a,c,i}, {b,c,f,i} and {a,b,c,d,e,f,g,i}
   arrive at the linear arrangement of them providing logical arguments. (10)
3. Is it possible to arrange the following sets in a linear order? If yes, provide all possible solutions. Use Petersen's algorithm. (10)
   {d, e}, {a, b}, {b, c, d, f , g, h, i}, {f , i}, {c, d, e, f , g, h, i}, {g, h}.
4. What is anuvṛtti?
   Explain how anuvṛtti brings in brevity with the following set of sūtras. The words in parenthesis are borrowed from the earlier sūtras for complete understanding of the sūtras. (10)

- upadeśe ac anunāsik it 1.3.2
  उपदेशे अच् अनुनासिक इत्
- (upadeśe) hal antyam (it) 1.3.3
  उपदेशे हल् अन्त्यम् इत्
- (upadeśe) na vibhaktau tusmāḥ (it) 1.3.4
  उपदेशे न विभक्तौ तुस्माः इत्
- (upadeśe) ādiḥ ñiṭuḍavāḥ (it) 1.3.5
  उपदेशे आदिः ञिटुडवः इत्
- (upadeśe ādiḥ) ṣaḥ pratyayasya (it) 1.3.6
  उपदेशे आदिः षः प्रत्ययस्य इत्
- (upadeśe ādiḥ pratyayasya) cuṭū (it) 1.3.7
  उपदेशे आदिः प्रत्ययस्य चुटू इत्
- (upadeśe ādiḥ pratyayasya) laṣaku ataddhite (it) 1.3.8
  उपदेशे आदिः प्रत्ययस्य लशकु अतद्धिते इत्

5. Explain the sūtra `ikaḥ yaṇ aci' and show how it resembles a context sensitive rule. (5)

6. Explain how the following 6 sūtras can explain the followig matrix showing 169 cases of sandhi.

L/R	a	A	i	I	u	U	ṛ	ṝ	ḷ	e	E	o	O
a	A	A	e	e	o	o	ar	ar	al	E	E	O	O
A	A	A	e	e	o	o	ar	ar	al	E	E	O	O
i	ya	yA	I	I	yu	yU	yṛ	yṝ	yḷ	ye	yE	yo	yO
I	ya	yA	I	I	yu	yU	yṛ	yṝ	yḷ	ye	yE	yo	yO
u	va	vA	vi	vI	U	U	vṛ	vṝ	vḷ	ve	vE	vo	vO
U	va	vA	vi	vI	U	U	vṛ	vṝ	vḷ	ve	vE	vo	vO
ṛ	ra	rA	ri	rI	ru	rU	ṛr	ṛr	ḷ	re	rE	ro	rO
ṝ	ra	rA	ri	rI	ru	rU	ṛr	ṛr	ḷ	re	rE	ro	rO
ḷ	la	lA	li	lI	lu	lU	ṛ	ṛr	ḷ	le	lE	lo	lO
e	eZ	ayA	ayi	ayI	ayu	ayU	ayṛ	ayṝ	ayḷ	aye	ayE	ayo	ayO
E	Aya	AyA	Ayi	AyI	Ayu	AyU	Ayṛ	Ayṝ	Ayḷ	Aye	AyE	Ayo	AyO
o	oZ	avA	avi	avI	avu	avU	avṛ	avṝ	avḷ	ave	avE	avo	avO
O	Ava	AvA	Avi	AvI	Avu	AvU	Avṛ	Avṝ	Avḷ	Ave	AvE	Avo	AvO

A,I,U stand for the long vowels.
Z is the 'avagraha' ऽ symbol used to represent elided (vanished) 'a', as in शिवोऽहम् for शिवः अहम् . (10)

- 6.1.77 ikaḥ yaṇ aci (saṁhitāyām) इकः यण् अचि
  {i,u,ṛ,ḷ} aC ⇒ {y,v,r,l} aC, in closed contact.
- 6.1.78 ecaḥ ay-av-āy-āvaḥ एचोऽयवायाव
  {e,E,o,O} aC ⇒ {ay,av,āy,āv} aC, in closed contact.
- 6.1.87 ād guṇaḥ (ekaḥ pūrvaparayoḥ aci saṁhitāyām) आद् गुणः
  a (short or long) and a vowel are (together) replaced by guṇa (a,e,o) in close contact.
- 6.1.88 vṛddhiḥ eci (ekaḥ pūrvaparayoḥ ād saṁhitāyām) वृद्धिः एचि
  a (short or long) and e,o,E,O are (together) replaced by vṛddhi (ā, E,O), in close contact.

- 6.1.101 akaḥ savarṇe dīrghaḥ (aci ekaḥ pūrvaparayoḥ saṁhitāyām)
  अकः सवर्णे दीर्घः
  aK (a,i,u,ṛ,ḷ) and a following vowel of the same features (color) are (together) replaced by a long vowel in close contact.
- 6.1.109 eṅaḥ padāntādati एङः पदान्तादति
  The initial 'a' of a word, if preceeded by a word ending in 'e' or 'o' gets elided. This elision is sometimes shown by the symbol 'avagraha' ऽ.