Questions 1-66: Choose the one best answer

1. A true statement about the sequence of development of secondary sexual characteristics in boys is:
   a. Maximum height has been reached when pubic hair extends onto the thighs.
   b. Peak height velocity occurs at the start of testicular enlargement (Tanner 2)
   c. Testicular enlargement (>3 ml volume >2.5 cm length) is the earliest sign of pubertal development in boys
   d. Pubic hair development is usually the first sign of puberty
   e. Scrotal darkening occurs before testicular enlargement

2. Which of the following is the most common side effect of the long-acting contraceptive Depo-Provera?
   a. Weight loss
   b. Pelvic inflammatory disease (PID)
   c. Dysmenorrhea
   d. Euphoric mood
   e. Menstrual irregularities

3. Most of the pregnancy tests used today utilize:
   a. Agglutination inhibition
   b. Rat prostate assay
   c. Radio immunoassay
   d. Enzyme immunoassay
   e. Friedman (rabbit) test

4. Which of the following is true regarding steroid biosynthesis during pregnancy?
   a. Placental 17 hydroxylase activity is used to make inhibin
   b. Progesterone can be produced in the fetus from pregnenolone
   c. Placental sulfatase activity is required to make estriol
   d. The fetal adrenal role is not important
   e. The placenta is able to produce cholesterol from acetate
5. Which of the following statements is true regarding progesterone?
   a. It is produced by the granulosa cells under the influence of GnRH
   b. Progesterone-LH positive feedback triggers ovulation
   c. It starts to rise in the early follicular phase of the cycle
   d. Progesterone production occurs only after fertilization
   e. It peaks in the midluteal phase

6. The length of the follicular phase of the menstrual cycle is:
   a. Variable in length
   b. Fixed at 14 days
   c. Dependent on the level of progesterone
   d. Shorter when the woman has a high estradiol level
   e. Important in determining whether pregnancy will occur

7. Which of the following is true regarding HCG (human chorionic gonadotropin) levels in the monitoring of a pregnancy?
   a. Patients with gestational trophoblastic disease have very low levels
   b. The level will not be detectable in the serum until at least 6 weeks of gestation
   c. An abnormal rise may be suggestive of an ectopic pregnancy
   d. During the third trimester, it is a useful measure of placental health

8. An 18-year-old female comes to the office, having started oral contraceptives two months ago, with complaint of vaginal spotting for 3-5 days during the middle of each of the last two menstrual cycles. The most appropriate treatment would be:
   a. Increase the estrogen potency of the oral contraceptive pill
   b. Increase the progesterone potency of the oral contraceptive pill
   c. Discontinue oral contraception
   d. Refer the patient to a gynecologist
   e. Advise the patient that such bleeding is common during the first three months

9. When treated with thyroid hormone replacement, a newly diagnosed 3-year-old with congenital hypothyroidism will exhibit catch up in:
   a. Both growth and development
   b. Growth but not development
   c. Development but not growth
   d. Neither growth nor development
10. A ten-year-old child who is cognitively functioning at the level of a 5-year-old has an approximate IQ of:

a. 5
b. 25
c. 50
d. 75
e. 100

\[ IQ = \frac{MA}{CA} \times 100 \]
\[ \frac{5}{10} \times 100 = 50 \]

11. Which of the following increases a woman's risk for a miscarriage?

a. Young age
b. Older age
c. First pregnancy
d. New sexual partner

12. Which of the following is not true concerning male gametogenesis?

a. Transformation of 1° to 2° spermatocytes (first meiotic division) takes place prior to ejaculation
b. Transformation of 2° spermatocytes to spermatids (2\textsuperscript{nd} meiotic division) takes place after ejaculation
c. In "normal" males there are at least 20 million sperm per ejaculation
d. Under normal circumstances, less than 1000 sperm achieve proximity to the egg

13. Interval Phase of the endometrium is characterized by:

a. Secretory changes in the endometrium
b. High rate of mitotic figures in the glandular epithelium and stromal cells
c. Breakdown of the endometrium
d. No specific change in the endometrium 3-4 days after ovulation

14. Which of the following statements regarding oral contraceptive pills (OCP) is not true?

a. Main mechanism of action is inhibition of ovulation
b. Women on OCP have less menstrual bleeding and less dysmenorrhea
c. OCP may protect against endometrial and ovarian cancer
d. OCP should not be prescribed for women with a past medical history of ectopic pregnancy
e. Because OCPs are metabolized by the liver, their use is contraindicated during active viral hepatitis
15. Which of the following statements about meiosis or mitosis is true from the perspective of female gametogenesis?
   a. Meiosis produces identical chromosomal components of the parent cell  
   b. Mitosis produces haploid cells with random combinations of chromosomes 
   c. Meiosis may occur throughout a woman's reproductive life 
   d. Mitosis allows transformation of primary to secondary oocyte

16. Which of the following is true concerning penetration of the cumulus mass of the egg by the sperm?
   a. The oocyte produces an enzyme, hyaluronidase, which prevents polyspermic fertilization 
   b. The sperm must pass between the granulosa cells prior to fertilization 
   c. The sperm is incorporated into the egg immediately prior to entering the perivitelline space 
   d. The cortical reaction facilitates sperm penetration

17. Which of the following is true concerning male gametogenesis and sperm formation?
   a. Sperm are produced in the prostate gland 
   b. The epididymis helps store sperm 
   c. The testes produce fructose 
   d. Sperm take approximately two to three weeks to make their transition from spermatocyte to a motile sperm 70 days.

18. Which of the following statements about female gametogenesis is not true?
   a. Oocytes are continually produced throughout a woman's life, peak at 5mo. 
   b. The second polar body of the oocyte is extruded with fertilization 
   c. Women typically ovulate one egg per cycle 
   d. More than one sperm may sometimes fertilize an egg 
   e. Most eggs never ovulate

19. If a male complaining of erectile dysfunction is experiencing erections during sleep, the etiology of his erectile dysfunction is most likely:
   a. Psychological 
   b. Organic 
   c. Mixed organic and psychological 
   d. Diabetes
20. Which of the following takes place within the egg and/or its vicinity following sperm penetration?

- Chemical degradation of all sperm surrounding the egg that have not penetrated it
- Formation of male and female pronuclei
- Release of the first polar body
- Release of the egg sperm complex from the ovarian follicle, allowing it to travel down the fallopian tube
- Release of locally toxic substances preventing other eggs from being released

21. Which of the following statements is not true concerning transport of the egg and fertilized ovum?

- Contraction within the fallopian tube aid in transport
- Cilia within the fallopian tube aid in transport
- It takes more than 24 hours for the egg (including the time before and after fertilization) to reach the uterus after its release from the ovary
- Implantation takes place within 24-48 hours after the fertilized egg reaches the uterus
- The egg is usually fertilized prior to reaching the uterus

22. In male gametogenesis, which of the following statements is true?

- Normal semen contains up to 10 million total motile sperm
- The majority of (but not all) males in the United States lose their fertility around age 51
- Anything impacting on spermatogenesis (eg severe viral infection) may not present as a decreased sperm count until over 2 months after the initial insult
- The testicles produce fructose to help in sperm survival after ejaculation
- The first meiotic division transforms a 2nd spermatoocyte into a spermatid

23. Which of the following statements concerning ovulation/fertilization is true?

- Upon release, the egg is surrounded by a gelatinous mass of cumulus cells which facilitate sperm penetration
- This mass of cells also helps implantation by helping the uterus "find" the embryo
- The cortical reaction prevents an abnormal sperm (eg carrying 2 bundles of DNA) from fertilizing the egg
- The association of maternal and paternal chromosomes marks the completion of fertilization
- The embryo is at the two to four cell stage at time of implantation
24. A 3330-gram female infant was delivered at 9:34 PM. At 9:35 PM the baby was crying with good respiratory effort and perfect muscle tone. Heart rate was 105 (compared with 160 on fetal monitoring at 8:34 PM). Body color (including extremities) was pink. Suction of nasal secretions resulted in sneezing. You are happy to inform the mother that her daughter's Apgar score at 1 minute was:

6
7
8
9
10

25. The following are the results of the Triple Maternal Prenatal Screen:

Alpha-fetoprotein = 0.5 MoM
HCG = 4.0 MoM
Unconjugated estriol = 0.6 MoM

The most likely abnormality is:

a. Trisomy 13
b. Open spina bifida
c. Omphalocele
d. Turner Syndrome (XO) - Hydropic
e. Trisomy 18

26. To which of the following maternal organs is there increased blood flow during pregnancy?

a. Breasts, skin, liver
b. Breasts, liver, kidneys
c. Breasts, liver, brain
d. Liver, kidneys, skin
e. Breasts, skin, kidneys

27. Which of the following are true statements about cardiovascular hemodynamics in normal pregnancy?

a. A blood pressure greater than 140/90 is considered abnormal
b. A patient who begins her pregnancy with a baseline blood pressure of 100/60 is unlikely to experience a mid-pregnancy decrease in systolic or diastolic pressures
c. Alteration in stroke volume accounts for the entire change in cardiac output
d. Central venous pressure is increased due to fluid retention
e. Systolic and diastolic murmurs occur with increased frequency
28. Which of the following statements are true about normal pregnancy?
   a. Pregnant patients are more likely to develop pyelonephritis if bacteriuria is untreated
   b. The finding of hydronephrosis on a renal ultrasound suggests obstruction
   c. Glycosuria is diagnostic of diabetes
   d. Plasma uric acid is increased

29. Which of the following statements best characterize the changes in the gastrointestinal system during pregnancy?
   a. Decreased motility in the stomach and intestines, as well as increased lower esophageal sphincter pressure
   b. Nausea, vomiting, diarrhea in early pregnancy
   c. Increased liver function tests including: aminotransferases, alkaline phosphatase, and bilirubin
   d. Increased absorption of water, calcium, and iron

30. Which of the following statements best describes the fetal circulation, as compared with maternal?
   a. Higher cardiac output, blood pressure, and systemic resistance
   b. Higher cardiac output and heart rate
   c. Higher stroke volume and heart rate
   d. Lower cardiac output and systemic resistance

31. Which of the following best describes the fetal hematologic system?
   a. Hemoglobin A replaces hemoglobin F by the end of pregnancy
   b. Newborns have a lower platelet count than adults do
   c. Coagulation factors may be decreased in the newborn
   d. Fetal erythrocytes have a longer lifespan than maternal erythrocytes

32. Which of the following diseases is not mediated by placental transfer of immunoglobulins?
   a. Rh isoimmunization
   b. Myasthenia gravis
   c. Thyroid disease
   d. IgA nephropathy
   e. Immune thrombocytopenic purpura
33. Which of the following best describes the fetal gastrointestinal system?

a. Liver function is characterized by decreased conjugation and increased glycogen production
b. The fetus is unable to produce insulin until after 20 weeks
c. Most amniotic fluid at term contains meconium
d. Fetal liver enzymes and bilirubin are normally increased

34. Which of the following statements about ectopic pregnancies in the United States is true?

a. There has been a decrease in the annual number of ectopic pregnancies each year.
b. There has been a small, but significant, increase in the number of total deaths attributed to ectopic pregnancies each year for the past several years.

35. Fetal hemoglobin has an increased affinity for oxygen as compared with adult hemoglobin. This difference results from:

a. An increased mass of fetal hemoglobin
b. Thinnness of the red cell membrane in the fetus
c. The presence of unconjugated bilirubin in the red cell
d. Decreased binding with 2,3-diphosphoglycerate (2,3-DPG)
e. Intracellular alkalosis

36. A 2-week-old infant whose birth weight was 3.13 kg now weighs 3.1 kg. The mother is breast feeding and reports good milk production. The infant nurses every 2 to 3 hours and has eight wet diapers per day. His physical examination is unremarkable. The best advice for this mother is to:

a. Hospitalize the infant for evaluation of failure to thrive
b. Continue to breast feed and return to the clinic in 1 week to recheck the infant's weight
c. Return to clinic for the 2-month health supervision visit
d. Stop breast feeding and change to formula
e. Supplement breast feeding with formula
37. The third stage of labor:
   a. Ends with delivery of the baby
   b. Begins with rupture of membranes
   c. Is associated with fetal distress
   d. Ends with expulsion of the placenta
   e. Usually lasts several hours

38. Neonatal Jaundice:
   a. Is a harmless by-product of red cell breakdown
   b. May be early and severe in neonatal hemolytic states
   c. Is milder in breast-fed than in formula-fed babies
   d. Is always a medical emergency
   e. Often results in choreathetotic cerebral palsy

39. You are on call in the labor room and are asked to evaluate a primagravida
    woman who has been in labor for 12 hours. Cervical dilation has been progressing
    normally and she has a temperature of 99.4°F. The fetal heart shows a baseline of 150
    beats per minute. Your best interpretation of the fetal heart tracing is:

   a. Tachycardia
   b. Bradycardia
   c. Tachycardia secondary to maternal fever
   d. Normal
   e. Acceleration of the heart rate

40. The principal stimulus for postnatal vasoconstriction of shunt vessels (e.g.,
     umbilical artery, ductus arteriosus) is:

   a. An increase in arterial pO2
   b. Locally secreted nitrous oxide
   c. Epinephrine
   d. Mechanical forces

41. A 32-year-old woman, now in her second pregnancy, reports that she had a c-
    section in her first pregnancy because her baby was too large. You next step is:

   a. You instruct her to limit her weight gain and not eat excessively to avoid another
      large baby
   b. You inform her that she will definitely need a repeat cesarean section
   c. You recommend genetic testing
   d. Your recommend that she have a blood glucose test one hour after 50 grams of
      glucose
   e. You recommend that she should take more iron supplements
42. The type of fetal heart rate deceleration most associated with placental insufficiency is called:
   a. A variable deceleration  
   b. A late deceleration  
   c. An early deceleration  
   d. Bradycardia

43. Which of the following is true about the seminal fluid?
   a. Testes and epididymis contribute only a small volume to seminal plasma
   b. Seminal vesicles contribute the largest volume to seminal plasma
   c. Prostate secretions are acidic and contain enzymes responsible for liquefaction
   d. Seminal vesicles secretions are alkaline and contain fructose
   e. All of the above

44. What is the optimal time to perform an amniocentesis?
   a. 24-28 weeks
   b. 9-13 weeks
   c. 15-20 weeks
   d. 5-30 weeks
   e. 4-9 weeks

45. All of the following medications may be used to relax the uterus except:
   a. Nifedipine (calcium channel blocker)
   b. Magnesium sulfate
   c. Prepadil (PGF₂ preparation)
   d. Indomethacin (cyclooxygenase inhibitor)

46. The acrosome reaction
   a. Can only take place if sperm have not undergone capacitation
   b. Allows the sperm to traverse the zona pellucida
   c. Is the process by which the acrosome is formed
   d. Results in improved sperm motility
   e. Is the first step in spermatogenesis
47. The 7 cardinal movements of labor, in order, are as follows:
   a. Engagement, descent, flexion, internal rotation, extension, external rotation, expulsion
   b. Engagement, flexion, internal rotation, descent, extension, external rotation, expulsion
   c. Descent, engagement, flexion, internal rotation, extension, expulsion, external rotation
   d. Flexion, internal rotation, engagement, descent, external rotation, extension, expulsion

48. The thermal neutral zone is:
   a. Room temperature of 28°C
   b. Core temperature of 36.5°C
   c. Air temperature with the least energy cost to maintain core temperature
   d. The beach in Cancun, Mexico

49. Asphyxia:
   a. Usually involves hypoxia and ischemia to multiple body systems
   b. Can be entirely prevented by fetal monitoring and cesarean section
   c. Can be diagnosed by a low 1-minute Apgar score
   d. Is the most common cause of mental retardation

50. The placenta:
   a. Is permeable to all maternal blood components
   b. Is impermeable to nearly all maternal blood components
   c. Metabolizes nearly everything presented to it
   d. Combines functions of passive diffusion, facilitated transport, and metabolism

51. Which of the following abnormalities is not common in the infant of a diabetic mother?
   a. Hypoglycemia
   b. Polycythemia
   c. Hyperbilirubinemia
   d. Hypercalcemia
   e. Hyperinsulinemia
52. You are evaluating a healthy 17-year-old boy for short stature. His growth chart reveals height measurements following the 5th percentile and weight measurements following the 25th percentile. On physical exam his sexual maturity rating (Tanner) is stage 2 pubic hair and stage 3 testicular volume. You diagnose constitutional delay of growth and puberty. His left-hand x-ray would most likely show a bone age:

a. Equal to the chronologic age
b. Greater than the chronologic age
C. Less than the chronologic age
e. Less than the height age

53. To develop normal fertilization capacity, spermatozoa must do all of the following except:

a. Undergo capacitation
b. Undergo the acrosome reaction
c. Pass through the epididymis
d. Be able to pass through the zona pellucida
e. Come in contact with ova within 2 hours of ejaculation

54. All of the following are true about breast-feeding except:

a. Oxytocin is responsible for the milk ejection (or let down) reflex
b. Breast fed babies have fewer allergies
C. Preterm babies cannot tolerate breast milk
d. The rapid decline in estrogen and progesterone after delivery initiates milk production
e. Breast fed babies have fewer episodes of diarrhea

55. Incompetent cervix:

C. Is due to a deficiency of progesterone
b. Is a cause of first trimester spontaneous abortion
C. Is a cause of intrauterine growth retardation
d. Is treated with suturing of the cervix, called cerclage

Questions 56 through 57

a. True precocious puberty
b. Premature thelarche (isolated breast development)
c. Both
d. Neither

56. a. Advanced bone age

57. d. Delayed bone age
Questions 58 through 59

a. Turner syndrome (45, XO)
b. Klinefelter syndrome (47, XXY)
c. Both
d. Neither

58. O Short stature

59. O Infertility

Questions 60-66:

At what age do at least 50% of children attain the following milestones?

60. ___ Walk independently __ months.
61. ___ Sit up alone and reach for a toy __ months.
62. ___ Pick up a cheerio with radial/palmar grip __ months.
63. ___ Stack 2 cubes and run __ months.
64. ___ Coo and smile responsively __ months.
65. ___ Pull to a standing position __ months.
66. ___ Point and vocalize to get their needs met __ months.

a. 3 months
b. 6 months
c. 9 months
d. 12 months
e. 18 months

Questions 67-88:

True (A) or False (B)

67. T(A) / F(B) In general terms, the height of the uterine fundus above the pubic symphysis is equal (in centimeters) to the gestational age (in weeks) between 20 and 28 weeks

68. T(A) / F(B) The progestin only pill cannot be used by women who are breastfeeding

69. T(A) / F(B) Depo-Provera is a combined progestin and estrogen contraceptive method

70. T(A) / F(B) A finding of sperm in the urine of a boy with Tanner Stage I-II is indicative of precocious puberty

71. T(A) / F(B) Androgens are believed to increase libido in women
72. T(A) / F(B) In a lactating woman there is more milk production during the night

73. T(A) / F(B) Oxygenated blood is carried to the fetus by the umbilical vein

74. T(A) / F(B) Polyspermy leads to production of more than 2 pronuclei

75. T(A) / F(B) Fetal urine is not produced by the fetal kidney until the last trimester

76. T(A) / F(B) Effacement and dilation commonly occur late in pregnancy prior to the onset of labor

77. T(A) / F(B) A small placenta may be expected in a mother suffering from preexisting diabetes mellitus with renal disease and proliferation of retinal blood vessels

78. T(A) / F(B) Most (55%-90%) of the menstrual cycles are anovulatory during the first 2 years after menarche

79. T(A) / F(B) Return to fertility in users of combined oral contraceptive pills is delayed for up to 4 months after discontinuation

80. T(A) / F(B) Vasectomy leads to production of antibodies to sperm in the majority of sterilized males

81. T(A) / F(B) The drug of choice for immediate treatment of pre-eclampsia is magnesium sulfate

82. T(A) / F(B) Amenorrhea in patients with anorexia nervosa is associated with increased LH and FSH levels

83. T(A) / F(B) More than a third of the cases of severe mental retardation can be traced to complications of labor and delivery

84. T(A) / F(B) Fetal crown-rump length obtained during ultrasound examination between 6 and 12 weeks predicts gestational age ± 3-4 days

85. T(A) / F(B) A deviation of 8-10 bpm from a baseline fetal heart rate of 160 bpm observed during intrapartum fetal monitoring is considered a normal beat-to-beat variability

86. T(A) / F(B) Phosphatidyl glycerol is a late-appearing surfactant component

87. T(A) / F(B) In the human fetus, the right ventricular output is about 1.3 times the left ventricular flow.

88. T(A) / F(B) The finding of a large retroplacental hematoma on the maternal surface of the placenta is indicative of placental abruption
Questions 89-100: Please note that one or more answers may be correct! (choose one of a, b, c, d, or e!)

89. Anovulatory menstrual cycle is characterized by:
   1. Elevated progesterone level in the blood
   2. Proliferative endometrial glands with cystic dilation
   3. Subnuclear vacuolation in the endometrial glands
   4. Unscheduled breakdown of the endometrium

   a. 1 & 3
   b. 2 & 4
   c. 1, 2, & 3
   d. 4 only
   e. All

90. Secretory endometrium corresponds to:
   1. A developing primordial follicle in the ovary
   2. High blood level of progesterone
   3. High level of estrogen in the blood
   4. Presence of corpus luteum in the ovary

   a. 1 & 3
   b. 2 & 4
   c. 1, 2, & 3
   d. 4 only
   e. All

91. Which of the following are true statements about metabolism during pregnancy?
   1. Normal maternal fasting glucose is lower than in the nonpregnant state ❌ ✅
   2. Normal maternal postprandial glucose is lower than in the nonpregnant state ✔
   3. Insulin secretion is increased during normal pregnancy ❌
   4. Serum lipids are decreased during normal pregnancy

   a. 1 & 3
   b. 2 & 4
   c. 1, 2 & 3
   d. 4 only
   e. All

92. Which of the following are increased during normal pregnancy?
   1. Cardiac output
   2. Plasma volume
   3. Pulsec
   4. Pulmonary capillary wedge pressure
   5. Systemic vascular resistance

   a. 1 & 3
   b. 2 & 4
   c. 1, 2 & 3
   d. 4 only
   e. All
93. Changes in pulmonary dynamics that occur during normal pregnancy include:
   1. Increased tidal volume
   2. Decreased residual volume
   3. Unchanged vital capacity
   4. Compensated respiratory acidosis
   a. 1&3
   b. 2&4
   c. 1,2&3
   d. 4 only
   e. All

94. Changes in renal function that accompany normal gestation include:
   1. Increased renal blood flow
   2. Increased glomerular filtration rate
   3. Decreased serum creatinine
   4. Increased protein excretion
   5. Decreased sodium excretion
   a. 1&3
   b. 2&4
   c. 1,2&3
   d. 4 only
   e. All

95. True statements about endocrine changes in pregnancy include:
   1. There is an increased production of cortisol, prolactin, and oxytocin
   2. Pregnancy is a mildly hyperthyroid state
   3. There is hypertrophy and hyperplasia of the pancreatic beta cells
   4. The decreased fetal plasma glucose, as compared with maternal, is due to maternal insulin
   a. 1&3
   b. 2&4
   c. 1,2&3
   d. 4 only
   e. All
96. Which of the following accurately reflect the hypercoagulable state of pregnancy?

1. Increase in venous stasis
2. Increase in several coagulation factors
3. Increased fibrinogen
4. Decreased bleeding time
5. Decreased clotting time

a. 1 & 3
b. 2 & 4
c. 1, 2 & 3
d. Only 4
e. All

97. Which of the following best describe changes in the reproductive tract during pregnancy?

1. There is increased vascularity of the cervix, vagina, uterus, and adnexae
2. Contractions begin to ripen the cervix in the first trimester
3. Uterine blood flow may be affected by maternal position and blood pressure
4. The uterus primarily enlarges due to cellular hyperplasia
5. The corpus luteum is the primary site of progesterone production for the first half of pregnancy

a. 1 & 3
b. 2 & 4
c. 1, 2 & 3
d. 4 only
e. All

98. Which of the following enable an increased percentage of oxygenated blood in the fetal circulation?

- Ductus venosus
- Ductus arteriosus
- Foramen ovale
- Umbilical arteries
- Fetal lungs

a. 1 & 3
b. 2 & 4
c. 1, 2 & 3
d. Only 4
e. All
99. Which of the following changes occur in the fetal circulation after birth?

1. The cardiac output increases  
2. The foramen ovale closes  
3. The systemic resistance increases  
4. The ductus arteriosus opens  
5. The pressure in the pulmonary artery increases

   a. 1&3  
   b. 2&4  
   c. 1,2&3  
   d. 4 only  
   e. All

100. Which of the following is/are true?

1. The primary component of surfactant is lecithin  
2. The fetal lung is mature at 24 weeks gestation  
3. Surfactant secretion is increased by glucocorticoids  
4. Respiratory distress syndrome is caused by abnormal phospholipid production

   a. 1&3  
   b. 2&4  
   c. 1,2&3  
   d. 4 only  
   e. All