LS REVIEW
Coordinate Systems, GPS and Geodesy

1) When discussing elevations using GPS, what best describes the height of a point above the geoid?
   a) Ellipsoid height
   b) Orthometric height
   c) Geoid Separation
   d) Differential level
   e) Z

2) Which datum is the GPS System based on?
   a) Lambert Conformal conic
   b) Universal Transverse Mercator
   c) NAD83
   d) WGS84
   e) CORS

3) What is the datum used for the GPS Navigation message
   a) NAD83 (CORS96)
   b) NAD27
   c) GRS80
   d) WGS84 (G1150)

4) Which of the following is not true?
   a) The signal for each satellite is independent from other satellites and is generated from its own onboard clocks
   b) The clocks in GPS satellites may also be called oscillators or frequency standards
   c) Every GPS satellite is launched with very stable atomic clock onboard
   d) The clocks in any one satellite area allowed to drift up to one nanosecond from GPS time before they are tweaked by the Control Segment

5) Which one of the following is not considered a cause for positioning error with GPS
   a) Time difference measurement
   b) Ephemeris Information
   c) Atmosphere
   d) Multipath
   e) All of the above cause errors.

6) GPS is known as a passive system, what does that mean
   a) The ranges are measured with signals in the microwave part of the electromagnetic spectrum
   b) Only the satellites transmit signals; the user receives them
   c) A GPS receiver must be able to gather all the signals it bounces off the satellites
   d) The signals from the GPS receiver return to the satellites

7) What is the advantage available using a dual frequency GPS receiver that is not available using a single frequency GPS receiver?
   a) A single frequency GPS receiver cannot collect enough data to perform single, double or triple difference solutions
   b) A dual frequency receiver affords an opportunity to tract the P code but a single frequency receiver does not.
   c) A dual frequency receiver has access to the navigation code, a single frequency does not
   d) Over long baselines, a dual frequency receiver has the facility of modeling and virtually removing the ionospheric bias, whereas a single frequency receiver cannot.

8) Which comparison of EDM and GPS processes is correct
   a) EDM and GPS signals are both reflected back to their sources
   b) EDM measurements require atmospheric correction, GPS ranges do not.
   c) EDM and GPS satellites both transmit modulated carriers
   d) Phase differencing is used in EDM measurements, but not in GPS

9) Which of the following satellite identifiers is most widely used?
   a) Interrange operation Number
   b) NASA catalog number
   c) PRN number
   d) NAVSTAR number

10) Which of the following errors are not reduced by using DGPS or RTK methods?
   a) Atmospheric errors
   b) Satellite clock bias
   c) Ephemeris bias
   d) Multipath

11) What is the meaning of Latency as applied to DGPS and RTK
   a) The baud-rate of a radio modem in real-time GPS
   b) The time taken for a system to compute corrections and transmit them to users in real time GPS
   c) The frequency of the RTCM SC104 correction signal in real time GPS
   d) The range rate broadcast with the corrections from the base station.

12) Assume a horizontal positional accuracy for the determination of a point using GPS to be 2 cm, and the vertical positional accuracy to be 3 cm. How many meters would two points have to be apart before I could be assured that the error in slope is less than 1.00%?
   a) Greater than 6.00m
   b) Greater than 3.00m
   c) Greater than 3.02m
   d) Greater than 6.04m

13) Which of the following correctly describes a characteristic both Cartesian coordinates and polar coordinates share?
   a) Each point has only one unique coordinate pair
   b) Coordinates are expressed in ordered pairs
   c) Angles are measured clockwise from north in degrees, minutes and seconds
   d) Coordinates are always positive

14) As one proceeds northward from the equator, which of the following does NOT happen?
   a) Meridians converge
   b) Latitudinal lines are parallel
   c) The force of gravity increases
   d) The distance represented by a degree of latitude gets shorter

15) Presuming all the numbers right of the decimal are significant, which values below is nearest to the precision of the following coordinates?

   Latitude = 60° 14’ 15.3278” Longitude = 149° 54’ 11.1457”
   a) ±10.0 ft.
   b) ±1.0 ft.
   c) ±0.10 ft.
   d) ±0.01ft.

16) What maximum uncertainty in measuring a vertical angle of 5° 00' 00" will result in a precision of at least 1:20,000 for the derived horizontal distance when the slope distance is 5000.00 feet? (Neglect curvature and refraction)
   a) 0° 00' 10"
   b) 0° 13' 05"
   c) 0° 00' 01"
   d) 0° 04' 03"
   e) 0° 01' 58"

17) You perform an open traverse and end on Control Point "Triad". Below are the coordinates you measured as well as the known coordinates. What is the "Error of Closure"?

Measured Coords	N 1234.56 ft	E 5647.85 ft
Known Coors	N 1234.64 ft	E 5647.88 ft

   a) 0.007 ft
   b) 0.080 ft
   c) 0.085 ft
   d) 0.098 ft
   e) 0.110 ft

18) Which of the following can be depended upon to define the flow of water?
   a) From a higher ellipsoidal height to a lower ellipsoidal height
   b) From a higher geodetic height to a lower geodetic height
   c) From a higher orthometric height to a lower orthometric height
   d) From a higher dynamic height to a lower dynamic height

19) Until the 1940's the Coast and Geodetic Survey stamped the elevation oof a point on its monuments. In what sense would these elevations be obsolete now?
   a) They would be expressed in feet not meters
   b) The elevations would be based on the Clarke reference ellipsoid
   c) The elevations would not be in the North American Datum of 1988
   d) The elevations would be dynamic rather than orthometric.

20) Which of the following formulas correctly represents the basic relationship between geodetic, geoidal and orthometric heights?
   a) H = h + N
   b) h = H + N
   c) N = H + h
   d) None of the above

21) The Grid Azimuth from Point "Monterey" to "KSLY" (4.5 miles away) is 253° 15' 48.2". The convergence angle is -1° 56' 34.5" and the Laplace correction is + 4.6". What is the geodetic azimuth from "Monterey" to "KSLY"
   a) 251° 19' 09.1"
   b) 251° 19' 13.7"
   c) 251° 19' 18.3"
   d) 255° 12' 18.1"
   e) 255° 12' 22.7"

22) The grid distance from "Monterey" to "KSLY" is 7,242.062 meters. The Ellipsoidal Reduction factor at Monterey is 0.99995632 and the line scale factor at Monterey is 0.99984532. What would you expect the measured horizontal distance from Monterey to KSLY to be.
   a) 23,755.29 sFt
   b) 23,752.15 sFt
   c) 23,764.76 sFt
   d) 23,764.71 sFt

23) What two factors affect combined distance scale value (Circle both)
   a) Distance
   b) Elevation
   c) Longitude
   d) Azimuth
   e) Latitude

24) A survey of a rectangular lot using a total station correctly shows the dimension of the lot as 563.45 feet by 83.5 feet. The area of the lot should be shown to the nearest:
   a) 1 Sq.Ft.
   b) 10 Sq.Ft.
   c) 100 Sq.Ft.
   d) 1000 Sq.Ft.
   e) 10000 Sq.Ft.

25) 10,000 meters equal?
   a) 3048.00 U.S. Survey Ft
   b) 3048.01 U.S. Survey ft
   c) 32,808.33 U.S. Survey ft
   d) 32808.39 U.S. Survey ft.
   e) 32808.45 U.S. Survey Ft.

Based on the partial Datasheet attached at the end of the test, answer the following questions

26) _____ What is the name of the monument?

27) _____ What State Plane Zone is it in?

28) _____ What is its orthometric height, in meters?

29) _____ What is the approximate Ellipsoid height in meters?

30) _____ What is the geoid separation at this point?

31) _____ Would this be an appropriate point for GPS?

32) _____ What road is it closest to?

33) _____ What is the approximate distance to the Lewis and Clark Expedition Monument in Feet

From this point you back sighted "Meriwether Montana Wheat Elev" and measured the following to Control Point "Kipp":

Average Horizontal Angle = 295° 15' 55"` Average Horizontal Distance = 5,281.65 m

34) _____ What is the Grid Azimuth to Kipp (SPC) (2 points)

35) _____ What is the Grid Distance (U.S. Survey Feet) to Kipp (SPC) (2 points)

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TM0855  DESIGNATION -  MONUMENT
TM0855  PID         -  TM0855
TM0855  STATE/COUNTY-  MT/GLACIER
TM0855  USGS QUAD   -  KIPP LAKE (1968)
TM0855
TM0855                        *CURRENT SURVEY CONTROL
TM0855  ______________________________________________________________________
TM0855* NAD 83(1992)-  48 35 56.34675(N)    112 47 49.85708(W)     ADJUSTED
TM0855* NAVD 88     -      1275.82   (+/-2cm)    4185.8    (feet)  VERTCON
TM0855  ______________________________________________________________________
TM0855  LAPLACE CORR-          -2.91  (seconds)                     DEFLEC09
TM0855  GEOID HEIGHT-         -14.70  (meters)                      GEOID09
TM0855
TM0855;                    North         East     Units Scale Factor Converg.
TM0855;SPC MT       -   488,394.256   356,933.996   MT  0.99977853   -2 24 42.9
TM0855;SPC MT       - 1,602,343.36  1,171,043.29   iFT  0.99977853   -2 24 42.9
TM0855;UTM  12      - 5,384,437.409   367,500.179   MT  0.99981570   -1 20 53.7
TM0855
TM0855!             -  Elev Factor  x  Scale Factor =   Combined Factor
TM0855!SPC MT       -   0.99980240  x   0.99977853  =   0.99958097
TM0855!UTM  12      -   0.99980240  x   0.99981570  =   0.99961813
TM0855
TM0855:                Primary Azimuth Mark                     Grid Az
TM0855:SPC MT       -  MONUMENT AZ MK                          234 08 16.8
TM0855:UTM  12      -  MONUMENT AZ MK                          233 04 27.6
TM0855
TM0855|---------------------------------------------------------------------|
TM0855| PID    Reference Object                    Distance      Geod. Az   |
TM0855|                                                          dddmmss.s  |
TM0855| TM0857 MERIWETHER MONTANA WHEAT ELEV       APPROX. 2.9 KM 0725437.5  |
TM0855| CN4880 MONUMENT RM 1                       13.848 METERS 21427      |
TM0855| TM0672 MONUMENT AZ MK                                    2314333.9  |
TM0855| TM0854 LEWIS AND CLARK EXPEDITION MON      92.858 METERS 29315      |
TM0855| CN4881 MONUMENT RM 2                       35.454 METERS 30824      |
TM0855|---------------------------------------------------------------------|
TM0855_U.S. NATIONAL GRID SPATIAL ADDRESS: 12UUU6750084437(NAD 83)
TM0855_MARKER: DO = NOT SPECIFIED OR SEE DESCRIPTION
TM0855_SETTING: 7 = SET IN TOP OF CONCRETE MONUMENT
TM0855_SATELLITE: THE SITE LOCATION WAS REPORTED AS SUITABLE FOR
TM0855+SATELLITE: SATELLITE OBSERVATIONS - June 21, 2006
TM0855                          STATION DESCRIPTION
TM0855
TM0855'DESCRIBED BY COAST AND GEODETIC SURVEY 1963 (JCC)
TM0855'THE STATION IS ABOUT 10-1/2 MILES EAST-NORTHEAST OF BROWNING,
TM0855'0.2 MILE NORTH OF U.S. HIGHWAY 2 AND ON THE HIGHEST
TM0855'POINT OF A SMALL EAST-WEST RIDGE BETWEEN THE HIGHWAY AND
TM0855'THE RAILROAD.
TM0855'
TM0855'TO REACH THE STATION FROM THE U.S. POST OFFICE IN BROWNING,
TM0855'GO SOUTH ON MAIN STREET FOR 0.25 MILE TO U.S. HIGHWAYS 2, 89
TM0855'AND 287.  TURN LEFT AND GO SOUTH AND SOUTHEAST ON HIGHWAYS
TM0855'2, 89 AND 287 FOR 3.5 MILES TO A FORK AND THE JUNCTION OF U.S.
TM0855'HIGHWAY 2.  TAKE THE LEFT FORK, EAST-NORTHEAST ON U.S. HIGHWAY
TM0855'2 FOR 7.8 MILES TO THE AZIMUTH MARK ON THE RIGHT.  CONTINUE
TM0855'AHEAD ON THE HIGHWAY FOR 1.2 MILES TO A SIDE ROAD ON THE
TM0855'LEFT AND SIGN (HISTORICAL MONUMENT 500 YARDS).  TURN LEFT AND
TM0855'GO NORTHWEST ON GRAVELED ROAD FOR 0.3 MILE TO THE HIGHEST
TM0855'POINT AND THE STATION.
TM0855'
TM0855'THE STATION MARK IS A STANDARD DISK, STAMPED MONUMENT 1963,
TM0855'SET IN THE TOP OF A 12 INCH SQUARE CONCRETE POST PROJECTING
TM0855'3 INCHES.  IT IS 70 FEET SOUTH OF THE CENTERLINE OF A GRAVELED
TM0855'ROAD AND 5.8 FEET WEST OF A WITNESS POST.
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