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Question 1

a)

Cos AB= cos Lat A cos Lat B cos P ± sin Lat A sin Lat B

= cos 33°53' cos 40°28' cos92°16' – sin 33°53' sin 40°28'

= -0.024979417 - 0.36182296

= - 0.386802378

AB = 112° 45.'3

= 6765.3 miles

b)

Speed = 16.5 knots

Time = 6765.3 / 16.5 = 410h 1m

= 17d 2h 1m

ETD Cape Town = 1000 ZT

Zone = -2

ETD = 20d 0800 GMT

Run = 17d 02h 01m

ETA = 07d 10h 01m May GMT

Zone NY = +4 (daylight saving)

ETA New York = 07d 0601 May

Question 2

a)

Time at ship	2330 14 June	Chron	03h 28m 29s
Approx LIT	+3h 55m	Error	0
Approx GMT	0325 15 June	GMT	03h 28m 29s 15th June

GHAγ	308°31.'6		
Inc.	7° 08.'4		
GHAγ	315° 39.'0		
SHA*	281° 16.'0	Dec	N 45° 58.'4
GHA*	236° 16.'0		
Long -	058° 42.'0		
LHA*	178° 13.'0		

A =	58.4 N	True Brg	358.7°(T)	358.7°(T)
B =	33.2 N	Compass	034°(C)	000° (G)
C =	91.6	Error	35.3° W	1.3°High
		Var	37°W	
Az =	N 1.3 W	Dev	1.7 E	
Brg =	358.7° (T)			

i) True Bearing 358.7°(T)

ii) Gyro Error 1.3°High

iii) Deviation 1.7°E

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b) As a general rule an Azimuth will be more reliable in high latitudes ~~that~~ than an Amplitude. Am Amplitude requires the sun to be on the Rational Horizon at the time of observation, and this, to the observer on the Earth's surface, is when the sun appears to be its' own semi-diameter above the horizon. In High latitudes, the sun rises at a fairly shallow angle to the horizon, and so we get a large change in Azimuth for a small change in altitude. Thus a small error in estimating when the sun is a semi-diameter above the horizon, ie the exact position for the amplitude to be taken, will give a large error in the bearing. Thus the accuracy of the amplitude is dependant on taking the observation with the sun in the correct position, whereas the accuracy of an azimuth is dependant on the time of the observation.

Question 3

Note:- This type of question is in fact a sunrise calculation, with some plane sailing thrown in. You are given a ship which will maintain her course and speed and another ship to Rendezvous with it. All that is required is to calculate the position of the first ship at sunrise by the double approximation method, and this gives you the GMT of sunrise and the R/V position. A straightforward calculation of bearing and distance will give the other ships course and speed required. No plotting required.

ETD	0500 GMT 27 Nov				
LIT	11h 04m				
Approx LMT	1604 27 Nov				
LMT SR 28th(35°S)	0440				
Inc	8				
LMT	0432 28th Nov				
LIT	11h 4m				
GMT SR	1728 27th				
Time int	12h 28m				
Speed	22 knots				
Dist run	22 x 12h 28m =	274.3'			
Start position		38°17' S		166° 04'E	
Run 288° x 274.3	dlat	01°24.'8 N	dlong	005° 26.'1W	dep 260.9
SR	lat	36° 52.'2S	Long	160° 37.'9 E	
	Mlat	37° 34.'6 S			
Lmt SR 28th(35°S)	0440				
Inc	7				
LMT	0433				
LIT	10h 43m				
GMT	1750				
Interval	12h 50m				
Run	22 x 12h 50m =	282.3'			

NOTE LAT IS SOUTH

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Q3

Start position 38°17'.5 166° 04' E

Run 288° x 282.3 dlat 1° 27.2' N dlong 005° 38.'7 W dep 268.5

Lat 36°49'.8S long 160° 25.'3 E

Mlat 37°33.'6.5

Lmt SR 28th (35°S) 0440

Inc 5

LMT 0435

LIT 10 h 42m

GMT 1753 27th Nov

a) GMT of R/V 1753 27th Nov

b) R/V position 36° 49.'8 S 160° 25.'3E

c)

Start Position 38° 10'S 161° 03' E

R/V 36°49.'8 S 160° 25.'3E

Dlat 1° 20.'2 N dlong 000° 37.'7 W

(Mlat 37° 39.'9) 80.2 37.7

Dep = 37.7 x cos 37°29.9

= 29.9

tan Co = Dep / Dlat = 29.9 / 80.2 = N 20° 26.'8W

= 339°33.'2 (T)

Course = 339.5°

Dist = dlat / Cos CO = 80.2 / cos 20°26.'8 = 85.'6

Time = 12h 50m

Speed = 6.7 knots