Term Test B version 1

(1) [5 points] Solve the following equation for r.
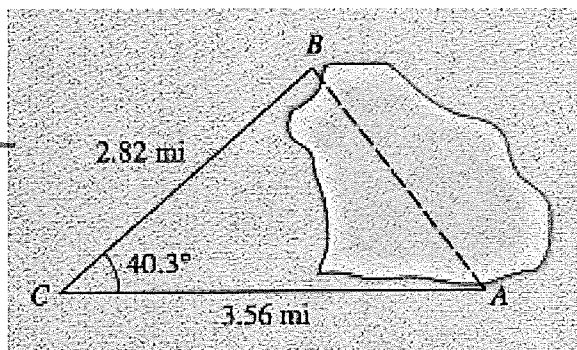
$$\frac{2}{r} - \frac{7}{r+5} = \frac{70}{r^2 - 25}$$

(handwritten) $r^2 + 7r + 10 = 0$

$r = -2$ or $r = -5$

$S = \{-2\}$

(2) [6 points] To find the distance across a small lake, a surveyor has taken the measurements shown. Find the distance across the lake using this information.

(handwritten)
$z^2 = 2.82^2 + 3.56^2$
$\quad - 2 \cdot 2.82 \cdot 3.56 \cdot$
$\qquad \cos 40.3°$
$z = 2.305$

(handwritten left margin)
$\tan \alpha = \dfrac{\Delta x}{\Delta y}$
$= -0.9505$
$x = -43.55°$
$316.45°$
$N 43.55° W$

(3) [6 points] Solve the following equation for angles between 360° and 720°.

$$\sin 2\vartheta = \tan \vartheta$$

(handwritten) $\sin \vartheta = 0$ or
$\cos^2 \vartheta = \frac{1}{2}$

(handwritten right column)
$360°$
$540°$
$405°$
$495°$
$585°$
$675°$
$720°$

(4) [5 points] What is the whole circle bearing from point $A = (0.8586, -4.4739)$ to $B = (-1.2040, -2.3039)$?

(handwritten left margin)
$37.02° =$
$\text{atan}\left(\dfrac{\Delta y}{\Delta x}\right)$
$\Delta y = 0.541$
bearing
$232.98°$
$S \, 52.98° W$

(5) [5 points] Paris and Vancouver are approximately on the same latitude (49°N). How far apart are they going along their circle of latitude? Paris is at 2.5°E longitude and Vancouver at 123°W.

(6) [3 points] Solve the following equation in $\mathbb{R}$. (This question is intended for students keen to achieve an excellent grade. Even though it is a challenging question, it is worth only 10% of the total grade.)

$$2 \cot 2\vartheta = \csc \vartheta$$

(handwritten)
$180°$
$120°$
$240°$

(handwritten right)
$r = 4184.41$
$l = R \cdot \cos 49° \cdot 125.5° =$
$9165.48 \, km$