**Chapter 4 TEST**

**Graphing Calculator Section**

1. At 1:00 pm, ship A is 25km due north of ship B.
If ship A is sailing west at a rate of 16 km/h and ship B is sailing south at 20 km/h, find the rate at which the distance between the two ships is changing at 1:30 pm. [3]

1. A box is to be made from a rectangular sheet of cardboard 70 cm by 150 cm by cutting equal squares out of the four corners and bending up the resulting 4 flaps to make the sides of the box. The box has no top. What is the largest possible volume of the box? [3]

**Chapter 4 TEST
NO Calculator Section**

1. a) Explain why the MVT applies to $f\left(x\right)=\frac{1}{x}$ on $[1,2]$, and what it states. [2]

b) Find any points in the open interval $\left(1,2\right)$ where the tangent line to $y=\frac{1}{x}$ is parallel to the chord line joining $\left(1, f(1)\right)$ and $\left(2,f(2)\right)$. [1]
2. Determine whether the given function has any local or absolute extreme values, and find those values if possible.

a) $f\left(x\right)=\frac{1}{x^{2}+1}$ [2]

b) $g\left(x\right)=\left(x-2\right)^{1/3}$ [2]

c) $h\left(x\right)=x\sqrt{2-x^{2}}$ [2]
3. Evaluate the following limits: [2]

a) $\lim\_{x\to 2}\frac{ln⁡(2x-3)}{x^{2}-4}$

b) $\lim\_{x\to 0}\frac{sin^{-1}x}{tan^{-1}x}$
4. The volume of a right circular cylinder is increasing at a rate of 2 cm3/min. When the volume of the cylinder is 60 cm3, the radius is 5cm and is increasing at 1cm/min. How fast is the height of the cylinder changing at that time? [3]
5. Let $f\left(x\right)=\left\{\begin{array}{c} x^{2} if x\geq 0 \\-x^{2} if x<0\end{array}\right.^{}$ [3]

a) Is 0 a critical point of *f*?

b) Does *f* have an inflection point at 0?

c) Is $f^{''}\left(0\right)=0$ ?
6. Determine the intervals of constant concavity of $g\left(x\right)=e^{-x^{2}}$and locate any inflection points. [3]

1. Use a suitable linearization to approximate $\sqrt[4]{85}$. [2]