

MAT 141
ASSIGNMENT 6

DUE OCTOBER 18, 2005

Please write proofs (or at least some reasoning if you can't give a full proof), not just answers! So if a problem asks whether some set has a maximum, do not just write "No", write "No, it doesn't because..."

As usual, you are allowed to use all the theorems stated in the appropriate chapters of the book (whether or not we have discussed them in class).

Notation:

\mathbb{Z} – set of integer numbers

\mathbb{P} – set of positive integer numbers

\mathbb{Q} – set of rational numbers

- (1) Section 2.4, problems 1, 8, 18, 19
- (2) Section 2.8, problems 19, 20, 21, 27
- (3) Section 2.13, problems 4, 13
- (4) Prove by induction that

$$\sum_{k=1}^n \cos(kx) = \frac{\sin(n + \frac{1}{2})x - \sin \frac{1}{2}x}{2 \sin \frac{1}{2}x}$$

[Hint: it is easier if you start induction with $n = 0$]

- (5) Find the volume of the body formed by intersection of two long cylinders of radius r intersecting at right angle (e.g., so that the axis of one cylinder is the x -axis, and the axis of the other is the y -axis).