Math 341
Some review (no calculator)

Set notation:
Ω = universal set
$\emptyset$ = empty set
A, B, etc. = subsets of Ω
A^c = complement of A (also denoted $\overline{A}$ or A')
$A \cap B$ = intersection of A and B (also denoted AB)
$A \cup B$=union of A and B

1. If $\Omega = \{a, b, c, d, e, f\}$, $A = \{a, b, c\}$, $B = \{b, d, f\}$, and $C = \{a, c, e\}$, then

   (a) $A^c =$

   (b) $A \cap B =$

   (c) $A \cup (B \cap C) =$

   (d) Verify DeMorgan's laws for this example:

   $(A \cup B)^c = A^c \cap B^c$

   $(A \cap B)^c = A^c \cup B^c$

2. Express as common fractions in lowest terms:

   (a) $\displaystyle\sum_{k=0}^{2} \frac{1}{(k+1)^2} =$

   (b) $\displaystyle\prod_{i=2}^{9} \frac{i}{i+1} =$

3. Give a general expression in terms of n:

   (a) $\sum_{i=1}^{n} i =$

   (b) $\sum_{i=1}^{n} i^2 =$

4. For what values of r do the following infinite series converge? To what value do they converge?

   (a) $\sum_{k=0}^{\infty} r^k =$

   (b) $\sum_{k=j}^{\infty} r^k =$

5. Compute:

   (a) $\sum_{i=0}^{\infty} \left(\frac{1}{2}\right)\left(\frac{1}{3}\right)^i =$

   (b) $\sum_{j=10}^{\infty} \left(\frac{1}{3}\right)^j =$

6. Compute:

   (a) $5! =$

   (b) $0! =$

7. Simplify to a common fraction in lowest terms:

   (a) $\frac{6!}{8!} =$

   (b) $\frac{10! + 8!}{11!} =$

   (c) $\frac{1}{\frac{6!}{2!\,4!}} =$