

## Selected answers to Merit Worksheet #18

1. (a) Test for geometric series, integral, comparison test, limit comparison, alternating series test  
(b) Test for geometric series,  $k$ th-term test for divergence, integral test, comparison test, limit comparison test  
(c) Integral test, comparison test, limit comparison test
2. False (remember the harmonic series)
3. (a) Converges (comparison test with  $\sum 1/k^2$ )  
(b) Diverges ( $k$ th-term test for divergence)  
(c) Diverges ( $k$ th-term test for divergence)  
(d) Diverges ( $k$ th-term test for divergence)  
(e) Converges (comparison test with  $\sum 1/k^2$ )  
(f) Converges (geometric series with  $|r| < 1$ )  
(g) Converges (integral test)  
(h) Diverges (integral test)  
(i) Diverges (comparison test with the harmonic series)  
(j) Converges (integral test)  
(k) Converges (limit comparison test with  $\sum 1/k^2$ )  
(l) Converges (comparison test with  $\sum (1.5)^k / 2^k = \sum (3/4)^k$ )  
(m) Diverges (limit comparison test with  $\sum \pi/k$ )  
(n) Diverges (equals the harmonic series)  
(o) Converges (alternating series test)  
(p) Diverges ( $k$ th-term test for divergence)  
(q) Converges (alternating series test)  
(r) Diverges ( $k$ th-term test for divergence)  
(s) Converges (geometric series with  $|r| < 1$ )  
(t) Converges (limit comparison test with  $\sum 1/k^2$ )

4.

$$0.99999\dots = \sum_{k=1}^{\infty} 9 \left( \frac{1}{10} \right)^k = \frac{9/10}{1 - (1/10)} = 1.$$

5. (a) 1; (f) 2/3; (s) 1/30; (t) 1/2

6. 2