Mathematics 1220 PRACTICE EXAM III Spring 2002
ANSWERS

1. $\ln(1+x) = x - x^2/2 + x^3/3 - x^4/4 + ...$, radius $= 1$
   $1/(1+x)^2 = 1 - 2x + 3x^2 - 4x^3 + ...$, radius $= 1$

2. $\cosh x = 1 + x^2/2! + x^4/4! + x^6/6! + ...$, infinite radius

3. (a) $(-1, 1/3)$, conditionally convergent at -1, divergent at $1/3$
   (b) $(-1/\tau, 1/\tau)$, $\tau = (1+\sqrt{5})/2$

4. (a) $|e^{-n}\sin n| \le e^{-n} \longrightarrow 0$
   (b) 1
   (c) Does not exist due to oscillation
   (d) $\displaystyle\int_0^1 e^{x^2}\,dx = 1 + \frac{1}{3} + \frac{1}{5\cdot 2!} + \frac{1}{7\cdot 3!} + ...$

5. 4 meters

6. (a) $h(x) = \ln(x+2)$ (b) similar to the lower left graph in Figure 4, p. 501.

7. $y_{n+1} = y_n + h(ay_n - by_n^2)$, $h = t_{n+1} - t_n$,
   or $x_{n+1} = \lambda(x_n - x_n^2)$, $x_n = bhy_n/\lambda$, $\lambda = 1 + ah$.

8. (a) converges conditionally
   (b) $\displaystyle\sqrt{1 - \cos\left(\frac{1}{n}\right)} \sim \frac{1}{n} \Longrightarrow$ divergence
   (c) converges absolutely (ratio test)
   (d) diverges (n^{th} term test)
   (e) converges absolutely (integral test)
   (f) converges absolutely (ratio test)