MATH 250
Exam 1
Fall 2005

ANSWER KEY

1. B
2. A
3. D
4. C
5. None; the closest answers are the one at top left, which represents the direction field of the equation \( y' = t - y \); and the one at bottom right, which corresponding to that of \( y' = y + t \).
6. B

7. (a) \( y = 1 - \sqrt{x^2 - \frac{2}{x} + 2} \)

(b) The interval is \((a, \infty)\), where \(a\) is the zero of \(x^3 + 2x - 2 = 0\). Equivalently, \(a\) is the (only) real root satisfying \(x^3 + 2x - 2 = 0\).

8. It will take \(\frac{48}{35} \ln 4 \approx 1.901\) years.

9. (a) \( f(y) = y^2 - 4y \)

(b) \( y = 0 \), which is stable; and \( y = 4 \), which is unstable.

(c) \( y = 2 \)
(d) 

(e) \( \lim_{t \to \infty} y(t) = 0 \)

10.  

(a) \( y(t) = C_1 e^{-2t} + C_2 e^t \)

(b) \( \beta = -6 \)