

MATH 244, SECTIONS 05, 06, 08

SOLUTIONS SAMPLE MIDTERM

Here are just the answers. Please write more than this in the exam!!!

- (1) 15j 16c 17g 18b 19h 20e
- (2) $y = (1/4)t^2 - (1/3)t + 1/2 + 1/(12t^2)$
- (3) $-\sqrt{2(2-x)(x+1)}$. Valid on $-1 < x < 2$.
- (4) Let $S(t)$ be the amount of salt at time t , so $S(0) = 100$. We have the equation $S'(t) = 3 - (2/t + 200)S$ (this comes from the fact that the volume of liquid in the tank at time t is $t + 200$. This has solution $S(t) = t + 200 - 4000000/(t + 200)^2$. The tank overflows at $t = 300$, and $S(300) = 500 - 400/25 = 484$, so the concentration is $484/500 = 0.968$. Limiting concentration is 1 pound/gallon.
- (5) The equilibrium solutions are $y = 0, 1$. Both are semistable.
- (6) $\psi(x, y) = xy^2 + (-2 + 2y - y^2)e^y = c$.
- (7) $y_1 = y_0 + (2y_1 = 3t_1)h$. $y_1 = (y_0 - 3t_1h)/(1 - 2h)$. $y_1 = -0.03/0.8$.
- (8) $y = e^t$. This goes to infinity as t goes to infinity.
- (9) The Wronskian is 0.
- (10) $0 < t < 4$.