Here are solution hints for practice exam:

Multiple choice questions: A, C, E, A, C, D, D, E, D, D.

Long answer questions (partial hints:)

Q 11 :

$$-x^2 + x + \frac{2}{13}\ln|x+5| + \frac{11}{13}\ln|x-8| + C$$

Q 12: Equilibria: -2 unstable, 0 stable, 3 unstable

Q 13: The general solution is $(2,-1,0) + t(-1,2/3,1), t \in \mathbb{R}$.

Q 14: Domain $\{(x,y) : y > 0\} \subset \mathbb{R}^2$, Range $\mathbb{R}$. Level curve for $k \in \mathbb{R}$: $y = e^{k+x}, x \in \mathbb{R}$. Tangent plane $z = -x + \frac{1}{e}y$.

Q 15:

$$\frac{2}{85} - \frac{9}{85}i$$

Q 16: Eigenvalues and eigenvectors: $\lambda_1 = -4, v_1 = s(1,-1), s \neq 0$, $\lambda_2 = -2, v_1 = t(1,1), t \neq 0$. (The conditions $s, t \neq 0$ are required!). The equilibrium is $(0,0)$ and it is stable. The x-nullcline is the line $y = 3x$, the y-nullcline is the line $y = 1/3x$.

Q 17: Equilibria: $(4,0)$ (not stable, eigenvalues of Jacobian are -3 and 6), $(2,1)$ (stable, eigenvalues of Jacobian are $-3 \pm 3i$) Trajectories that start on the x-axis should approach the equilibrium $(4,0)$, all other trajectories should approach the the equiuilibrium $(2,1)$. See posted review for more details on this type of problem.