

## Answers to Extra Exercise Problems for Exam 1

1. (a) True. (b) False. (c) False. (d) False.
2. True.
3. False.
4. True.
5. False.
6. True.
7. True.
8. True.
9. True.
10. False
11. True.
12. True.
13. False.
14. True.
15. True.
16. False
17. True.
18. True.
19. (a)  $c_1 + 2c_2 - c_3 = 1$       (b)  $c_1 = 3r - 1$   
 $2c_2 + 5c_3 = 3$                        $c_2 = -r + 1$   
 $c_1 + 3c_2 = 2$                           $c_3 = r, r \in \mathbb{R}$
20.  $c_1 = -2, c_2 = -1, c_3 = 1$ . General solutions are  $c_1 = -2s$   
 $c_2 = -s$   
 $c_3 = s, s \in \mathbb{R}.$

21. (a) Yes. Justify the answer.  
 (b) Yes. Justify the answer.
22. For example,  $A = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$ , or  $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ , or  $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$ .  
 $B = \begin{pmatrix} 0 & c \\ 0 & 0 \end{pmatrix}$ , where  $c$  can be any nonzero real number.
23. (a)  $a =$  any real number but  $3, -2$ .  
 (b)  $a = 3, x_1 = 9, x_2 = 2 - 6s + 2t, x_3 = s, x_4 = t, s, t \in \mathbb{R}$ .  
 $a = -2, x_1 = 4, x_2 = 2 + 4s - 3t, x_3 = s, x_4 = t, s, t \in \mathbb{R}$ .  
 (c) No such value for  $a$ .
24. (a) All values.  $x = 1, y = -3 - \frac{1}{2}t, z = -2 - \frac{1}{2}t, t \in \mathbb{R}$ .  
 (b)  $t = 0$ .
25.  $t = 3$  or  $-2$ .
26. (a)  $a = 0$  and  $b = 0$ . (b)  $a \neq 0$  and  $b = 0$  (c)  $a \neq 0$  and  $b \neq 0$ .  
 (d)  $x_1 = 0, x_2 = 0, x_3 = 1$ .
27.  $A$  has an inverse matrix.  $A^{-1} = \begin{pmatrix} 1 & 1/3 & 5/3 \\ 0 & 0 & -1 \\ 0 & -1/3 & -2/3 \end{pmatrix} \cdot x = \begin{pmatrix} 29/3 \\ -5 \\ -11/3 \end{pmatrix}$ .