SOLUTIONS TO 2002 1090 EXAM #2

1.

(a) F	(b) F	(c) F	(d) F	(e) F

2. Recall the revised problem #2: we are to find the sum of the first thirty terms of the arithmetic sequence with difference 3 and thirtieth term 103. If the thirtieth term is 103, then the first term is $103 - 3 \cdot 29 = 16$. Now we use the sum formula

$$a_1 + \cdots + a_{30} = \frac{1}{2}(30)(a_1 + a_{30}) = 15 \cdot 119 = 1785.$$

3. (a)

$$\begin{gathered} x + y \leq 25 \\ 60 \leq 6x + 11y \leq 220 \\ x \geq 0, y \geq 0. \end{gathered}$$

(b) $P = 10000x + 18000y$

(c) First graph the region described by the equations in (a) and locate the corners. This region will be closed and bounded. Since a linear function restricted to a closed and bounded region attains its maximum at corners, we then plug in the corner values into the equation for P in (b) to find the maximum. (If the maximum is achieved at two corners, it is also achieved on the line segment between them.)

4 (a) A^2 doesn't make sense.

(b)

$$B^3 = \begin{pmatrix} 0 & 8 \\ 8 & 0 \end{pmatrix}.$$

(c) $\det(C) = 1$.

5. (a) 6.

(b) $\frac{1}{e^3}$.

(c) -3.

6. Plot the lines $y = x$ (dashed) and $y = -2 - 2x$ (solid). These lines meet at $(-2/3, -2/3)$. The two lines break the plane into four parts. Shade the part that contains the point $(0, -2)$.

7(a)

$$\begin{aligned}
\log_a(\frac{z}{\sqrt{yz}}) &= \log_a(z) - \frac{1}{2}\log y - \frac{1}{2}\log_a z \\
&= \frac{1}{2}\log_a z - \frac{1}{2}\log_a y \\
&= \frac{1}{2}(1.2) - \frac{1}{2}(3) = -0.9.
\end{aligned}$$

(b)

$$\begin{aligned}
\log_a(x^2 z^{100}) &= 2\log_a x + 100\log_a z \\
&= 2(-2.4) + 100(1.2) = 115.2.
\end{aligned}$$

8. $\frac{2}{3}\log_a(x+1)$

9(a) 1000.

(b)

$$t = \frac{\ln\left(\frac{\ln(P/1000)}{\ln(0.005)}\right)}{\ln(0.3)}.$$