MATH 126 FINAL EXAM ANSWERS
WINTER 2013

1. (a) No. One possible justification is: the plane through $(2,2,2)$, $(1,0,0)$, and $(2,3,7)$ is $8x-5y+z=8$ and $8(5)-5(5)+5 \neq 8$.

   (b) $\dfrac{13}{90}\langle 8,-5,1\rangle = \left\langle \dfrac{52}{45}, \dfrac{-13}{18}, \dfrac{13}{90} \right\rangle$

2. (a) $\mathbf{T}(t) = \left\langle \dfrac{2}{t+2}, \dfrac{t}{t+2}, \dfrac{2t^{1/2}}{t+2} \right\rangle$

   (b) $2(x-2)+(y-\frac{1}{2})+2(z-\frac{4}{3})=0$

   (c) $\kappa(t) = \dfrac{1}{\sqrt{t}(t+2)^2}$ and $\lim\limits_{t\to\infty} \kappa(t) = 0$. The curve gets "straighter" as $t \to \infty$.

3. (a) i. point; ii. ellipse; iii. pair of lines; iv. hyperbola; v. pair of lines; vi. hyperbola.

   (b) cone

   (c) T, T

4. $x+y+z=3$

5. (a) $z=-3(x-2)+8(y-2)-6$

   (b) -6.43

6. 18 inches by 18 inches by 36 inches

7. (a) $\dfrac{1}{3}\sin 1$

   (b) $2\pi\left[\dfrac{1000-2(50)^{3/2}}{3}\right]$

8. (a) $x^3e^{x^2} = \displaystyle\sum_{k=0}^{\infty} \frac{x^{2k+3}}{k!}$ for all real x

   (b) $T_5(x) = x^3 + x^5$

   (c) $g(x) = \displaystyle\sum_{k=0}^{\infty} \frac{x^{2k+4}}{(2k+4)k!}$ for all real x

9. (a) $T_2(x) = 2 + \frac{1}{12}(x-8) - \frac{1}{288}(x-8)^2$

   (b) $|f(x)-T_2(x)| \leq \frac{10}{6\cdot 27\cdot 7^{8/3}} \approx 0.0003443$ (Larger bounds accepted.)

   (c) $\sqrt[3]{9} \approx \frac{599}{288} \approx 2.07986$