FINAL EXAM ANSWERS
MATH 126 WINTER 2012

1. (a) T; (b) F; (c) T; (d) T; (e) T; (f) F; (g) F; (h) T; (i) F; (j) T

2. (a) No.
   (b) $2x - y = 0$

3. (a) $\kappa(t) = \dfrac{\sqrt{5}}{(1 + 4\sin^2 t)^{3/2}}$
   (b) $\mathbf{r}(t) = \langle \sin t, 1 + \cos t, 2 + 2\cos t \rangle$

4. The only critical point is $(e, 1)$. It is a saddle point.

5. $x = 1 + 4t, y = 1 + 5t, z = -1 + 5t$

6. The shortest distance is $\sqrt{\frac{15}{2}}$.

7. 44π

8. (a) $T_3(x) = -2 + (x-1) + 2(x-1)^2 - \frac{1}{3}(x-1)^3$
   (b) Many correct answers. Two of the many possibilities:
      I. $|f(x) - T_3(x)| \leq \dfrac{a^4}{6(1-a)^3}$.
      II. $|f(x) - T_3(x)| \leq \dfrac{8}{3}a^4$. (Uses the fact that $a \leq \frac{1}{2}$.)
   (c) Many correct answers. Two possibilities based on the answers in (b).
      I. Using the fact that $0 < 1-a < 1$, show that $|f(x)-T_3(x)| \leq \dfrac{a^4}{6(1-a)^3} < \dfrac{a^4}{6(1-a)^4}$. Then any $a < 0.2177$ will work.
      II. Using the error bound $|f(x) - T_3(x)| \leq \dfrac{8}{3}a^4$, any $a \leq 0.139$ will work.

9. (a) $\displaystyle\sum_{k=0}^{\infty} \left((-1)^k + \frac{(-2)^k}{k!} \right) x^{2k}$
   (b) $(-1, 1)$
   (c) 1.6000