MATH 126 FINAL EXAM ANSWERS
SPRING 2014

1. (a) $T_2(x) = -1 + 4(x-1) - \frac{5}{2}(x-1)^2$

   (b) $|f(x) - T_2(x)| \leq \frac{5}{3}\left(\frac{a}{1-a}\right)^3$

   (c) any a such that $a \leq 0.375$

2. (a) $\displaystyle\sum_{k=0}^{\infty}\left(\frac{1}{k!} + \frac{1}{2^k}\right)x^{3k+1}$

   (b) $-2^{1/3} < x < 2^{1/3}$

   (c) $1 + \dfrac{3}{10} + \dfrac{3}{32} = 1.39375$

3. $\dfrac{1}{3} + \dfrac{\pi}{16}$

4. $\dfrac{\pi}{4} - \dfrac{\ln(2)}{2}$

5. $T(x,y) = 15(x-3) - 9(y-5)$, $f(3.02, 4.9) \approx T(3.02, 4.9) = 1.2$

6. 18

7. (a) $z = \frac{1}{2}(x-1) + (y-1) + 1$

   (b) Yes. At every value of t,

$$\left(\sqrt{3}\sin(t)\right)^2 + 2\left(\frac{\sqrt{3}}{\sqrt{2}}\cos(t)\right)^2 - 2(1)^2 = 3\sin^2(t) + 3\cos^2(t) - 2 = 1.$$

   (c) $\mathbf{B}(t) = \langle 0, 0, -1\rangle$

8. (a) $\mathbf{r}(t) = \langle 1 - \cos(t), \frac{1}{2}t - \frac{1}{4}\sin(2t), t + 4t^2\rangle$

   (b) $|\mathbf{r}'(\pi/2)| = \sqrt{16\pi^2 + 8\pi + 3}$

9. (a) $\kappa(1) = \dfrac{\sqrt{37}}{26\sqrt{2}}$

   (b) $P\left(\frac{4}{3}, 8, 17\right)$