

FINAL EXAM ANSWERS
MATH 126 AUTUMN 2012

1. (a) $\mathbf{v}(t) = \langle t^2, 0, \cos t \rangle$
(b) $a_T = \frac{2t^3 - \sin t \cos t}{\sqrt{t^4 + \cos^2 t}}$
(c) $\mathbf{r}\left(\frac{\pi}{2}\right) = \left\langle \frac{1}{3} \left(\frac{\pi}{2}\right)^3 + 1, 2, 301 \right\rangle$
2. (a) $\kappa(t) = \frac{2\sqrt{2}}{(t^2 + 2)^2}$
(b) $(-1, 0, -2)$
3. (a) T; (b) F; (c) F; (d) T; (e) F; (f) T; (g) F; (h) F; (i) T; (j) T
4. $3x + 4y + 12z = 0$
5. $f(2.9, 1.05) \approx \frac{226}{15}$
6. $\max=1 + 22\sqrt{11}$ and $\min=1 - 22\sqrt{11}$
7. (b) $\frac{9\sqrt{3}}{4} - \frac{3\pi}{4}$
(c) $\frac{27}{8}$
8. (a) $T_2(x) = 5x^2$
(b) $f(0.02) \approx T_2(0.02) = 0.002$
(c) $|f(0.02) - T_2(0.02)| \leq 0.0001033$ (other answers are possible)
(d) On the calculator, $|f(0.02) - T_2(0.02)| = |0.02 \ln(1.1) - 0.002| \approx 0.0000938 < 0.0001033$.
The bound in (c) is larger precisely because it is an *upper bound* for the error.
9. (a) $x \cos\left(\frac{1}{2}x^2\right) = \sum_{n=0}^{\infty} \frac{(-1)^n x^{4n+1}}{4^n (2n)!} = x - \frac{x^5}{8} + \frac{x^9}{384} - \frac{x^{13}}{46080} + \dots$
(b) $T_{10}(x) = x - \frac{x^5}{8} + \frac{x^9}{384}$
(c) $f^{(17)}(0) = \frac{(-1)^4 (17!)}{4^4 (8!)} = 34459425$