

MATH 126 – FINAL EXAM Hints and Answers
AUTUMN 2013

1. (a) $\vec{v}(t) = \langle 4\sqrt{1+t}, 1, t^2 - 5t \rangle$
(b) $a_T = \frac{2}{\sqrt{101}}, a_N = \frac{\sqrt{198}}{\sqrt{101}}$
(c) $\int_0^3 \sqrt{16(1+t) + 1 + (t^2 - 5t)^2} dt$
2. (a) $P(9, 7, 2)$
(b) $\cos^{-1}\left(\frac{20}{\sqrt{102}\sqrt{53}}\right) = 74.22^\circ$
(c) $x + y + 10z = 36$
3. $(12, -9, 22)$
4. (a) $y = x + 2$
(b) $\int_{\pi}^{2\pi} \int_2^{2-2\sin\theta} r dr d\theta$
5. (a) $(0, 0)$ gives a local min
(b) absolute min is 0, absolute max is $\sin(1)$
(c) $\pi(1 - \cos(1))$
6. $\cos(1) - 1$
7. $z - 1 = -\frac{3}{2}(x + 1)$
8. (a) $T_2(x) = 1 - 2x - x^2$
(b) $|T_2(x) - f(x)| \leq \frac{4e^2}{3} \approx 9.8521$ (any reasonable larger bound is OK)
(c) $x \approx \sqrt{2} - 1$
9. (a) $\cos(2x) = 1 - \frac{2^2x^2}{2!} + \frac{2^4x^4}{4!} - \frac{2^6x^6}{6!} + \dots$
(b) $\cos^2(x) = \frac{1}{2}(1 + \cos(2x)) = \frac{1}{2}\left(2 - \frac{2^2x^2}{2!} + \frac{2^4x^4}{4!} - \frac{2^6x^6}{6!} + \dots\right) = 1 - x^2 + \frac{2^3x^4}{4!} - \frac{2^5x^6}{6!} + \dots$
(c) $\frac{1}{3}$