

MATH 126 – FINAL EXAM Hints and Answers
AUTUMN 2016

1. (a) $D(3, 8, -1)$
(b) $\text{area} = \sqrt{165}$
(c) $E = \left(\frac{32}{13}, \frac{18}{13}, \frac{50}{13}\right)$, the picture on the RIGHT is correct
2. (a) $3x - 5y - 5z = -19$
(b) $x = 3t, y = 5 - 5t, z = -5t$
(c) $\left(\frac{18}{59}, \frac{265}{59}, -\frac{30}{59}\right)$
3. (a) $\mathbf{v}(t) = \frac{1}{2}\sin(2t)\mathbf{i} + \frac{1}{2}(1 - \cos(2t))\mathbf{j} + t\mathbf{k}$
(b) $x(t) = \frac{1}{4}(1 - \cos(2t)), y(t) = \frac{t}{2} - \frac{1}{4}\sin(2t), z(t) = \frac{1}{2}t^2$
4. (a) $\mathbf{r}'(t) = \langle -2e^{-2t}, \sec^2 t, 3t^2 + 1 \rangle$
(b) $\mathbf{T} = \left\langle -\frac{2}{\sqrt{6}}, \frac{1}{\sqrt{6}}, \frac{1}{\sqrt{6}} \right\rangle$
(c) $x = 1 - 2t, y = t, z = t$
(d) No. The system of equations $1 - 2t = 1, t = 1, t = 1$ has no solution.
5. (a) $\text{slope} = -3$
(b) $x = \frac{1}{3}e^{3\pi/2}$
6. absolute max = 10; absolute min = 7
7. $K = \sqrt{\frac{8000}{\pi}}$
8. (a) $f(x) = \sum_{k=0}^{\infty} (-1)^k \frac{x^{8k+6}}{(2k+1)!}$
(b) $T_3(x) = 0$ for all x
(c) $|f(x) - T_3(x)| \geq 0$ for all values of x and $|f(0) - T_3(0)| = |0 - 0| = 0$. So the smallest value of $|f(x) - T_3(x)|$ on the interval from -1 to $\pi/2016$ is 0.
9. (a) $F(x) = \sum_{k=0}^{\infty} \frac{x^{2k+1}}{(2k+1) \cdot k!}$
(b) $T_3(x) = \frac{1}{2}x^2$
(c) One possible answer: $|H(x) - T_2(x)| \leq \frac{e^{16} \cdot 4^3}{6}$