

Math 126 Spring 2016
Final Exam Answers

1. (a) $2x - y = 0$
(b) $\cos^{-1}\left(\frac{15}{\sqrt{5}\sqrt{51}}\right)$
2. (a) FALSE; (b) TRUE; (c) TRUE;
(d) $(0, 1, 0)$, $(0, -1, 0)$, $(1, 0, 0)$, $(-1, 0, 0)$
3. (a) Find t and s such that $\mathbf{r}_1(t) = \mathbf{r}_2(s)$. This occurs when $t = 1$ and $s = 0$ and again when $t = 3$ and $s = \frac{1}{2}$.
The paths intersect at $(1, 1, 1)$ and $(3, 9, 27)$
(b) Since $s \neq t$ for either solution, the particles do not collide.
4. $x + y = 3$
5. Max value is 3 (occurs at the point $(2, \sqrt{5})$). Min value is -9 (occurs at the point $(0, 3)$).
6. $\int_0^1 \int_0^{\arctan y} \frac{\sin x}{1 + y^2} dx dy = \int_0^{\pi/4} \int_{\tan x}^1 \frac{\sin x}{1 + y^2} dy dx = \frac{\pi}{4} - \frac{\sqrt{2}}{2}$
7. $\bar{y} = \frac{6 - 3 \ln 2}{12\sqrt{3} - 12 - \pi}$
8. (a) $T_2(x) = e + 2e(x - 1) + 3e(x - 1)^2$
(b) On $[0, 2]$,
$$|f'''(x)| = (8x^3 + 12x)e^{x^2} \leq 88e^4.$$
Using $M = 88e^4$, $|T_2(x) - f(x)| \leq \frac{44}{3}e^4$. (Other correct answers are possible.)
(c) At $x = b$, there is no error. So, the smallest value of $|T_2(x) - f(x)|$ is 0.
9. (a) $\sum_{k=0}^{\infty} \frac{(-1)^k x^{2k+4}}{(2k+4)9^{k+1}}$
(b) $(-3, 3)$
(c) $F^{(10)}(0) = \frac{-10!}{10 \cdot 9^4}$