

## Math 323 - Review 1 Answers - Spring 25

**Note:** Recall that parametrizations are not unique.

1.) (a.) orthogonal (b.) neither (c.) parallel

2.)  $23x + 4y + 7z = 70$

3.)  $(2, -1, 5)$

4.)  $\ell_1$  : parallel to  $\ell_0$

$\ell_2$  : skew to  $\ell_0$

$\ell_3$  : intersects  $\ell_0$

5.)  $2x - 4y - 5z = 1$

6.)  $x = 3 + 7t, y = 1 + 11t, z = -t$

7.)  $x = -2 + 3t, y = 1 - 4t, z = -10 - 2t$

8.)  $\mathbf{r}'(t) = \langle e^{t \sin(3t)} [\sin(3t) + 3t \cos(3t)], \frac{3t + 10}{(3t^2 + 2)^{3/2}}, \frac{3t \sec^3(\sqrt{1+t^2}) \tan(\sqrt{1+t^2})}{\sqrt{1+t^2}} \rangle$

9.)  $x = 5 - 16t, y = 2 - 14t, z = 4 + 5t$

10.)  $\mathbf{r}(t) = \langle \frac{1}{3}t^3 + 1, e^t + 2, 3 - \cos(t) \rangle$

11.)  $\langle e^t - \ln(e^t + 1), \tan^{-1}(e^t), \frac{1}{2} \ln \left| \frac{e^t - 1}{e^t + 1} \right| \rangle + C$

12.) (a.) 42

(b.)  $\sqrt{37} - \sqrt{10} + \ln\left(\frac{\sqrt{37}-1}{2\sqrt{10}-2}\right)$  ( $= \sqrt{37} - \sqrt{10} + \ln\left(\frac{2\sqrt{10}+2}{\sqrt{37}+1}\right)$ )

13.) (a.) Show. (b.)  $\ln(3) - \frac{1}{2}$

14.) (a.)  $\frac{5\sqrt{3}}{g}$  km (b.)  $\frac{3.75}{g}$  km

15.)  $(5, 15, 2)$  and  $(19, 133, 12)$

16.)  $\langle \frac{\sqrt{3}}{2}, \frac{\sqrt{2}}{4}, \frac{\sqrt{2}}{4} \rangle$  or  $\langle \frac{\sqrt{3}}{2}, -\frac{\sqrt{2}}{4}, -\frac{\sqrt{2}}{4} \rangle$

17.)  $(-64, 16, -4)$  and  $(\frac{125}{8}, \frac{25}{4}, \frac{5}{2})$

18.)  $\sqrt{14} - 3$  units

19.)  $x = 2 + t, y = -3 + 4t, z = -1 + 3t$