

ANSWERS TO

REVIEW PROBLEMS FOR EXAM #1, 251-13-14-15, FALL 2001

1. $8x + 3y - 3z = 2$, and $A = 5\sqrt{82}/2$
2. 5π
3. $x = 2t + 2$, $y = -3t - 7$, $z = t + 5$.
4. 1
5. $2x + y - z = 1$
6. $a_{tang} = \cos(t/2)$, $a_{nor} = \sin(t/2) = \sqrt{(1 - \cos t)/2}$.
7. $\frac{e^x}{(1 + e^{2x})^{3/2}}$, max at $x = -\frac{\ln 2}{2}$.
8. $\frac{\partial z}{\partial x} = -\frac{yz - 2x \cos(x^2 + 2y + z)}{xy - \cos(x^2 + 2y + z)}$
9. $5x + 4y + 3z = 22$
10. $\arccos \sqrt{2/3}$
11. $\mathbf{r}'(t) = (\frac{t^2}{2} + 1)\mathbf{i} + (t + 2)\mathbf{j} + (\frac{t^3}{3} + 1)\mathbf{k}$, $\mathbf{r}(t) = (\frac{t^3}{6} + t)\mathbf{i} + (\frac{t^2}{2} + 2t)\mathbf{j} + (\frac{t^4}{12} + t)\mathbf{k}$.
12. $\mathbf{T}(t) = \frac{1}{\sqrt{t^4 + t^2 + 1}}(t^2\mathbf{i} + t\mathbf{j} + \mathbf{k})$ and $\kappa = \frac{\sqrt{t^4 + 4t^2 + 1}}{\sqrt{t^4 + t^2 + 1}^3}$.
13. $\theta = \arccos(1/6)$, and $x = 1 + 5t$, $y = t$, $z = -3t$.
14. Does not exist.
15. $\frac{dF}{dt} = \frac{c}{(h + R)^2} \frac{dm}{dt} - \frac{2cm}{(h + R)^3} \frac{dh}{dt}$.
16. $\frac{\partial z}{\partial s} = 4xs \sin y + 2x^2t \cos y$ and $\frac{\partial z}{\partial t} = 4xt \sin y + 2x^2s \cos y$
17. $\frac{\partial z}{\partial u} = \frac{\partial z}{\partial x} + \frac{\partial z}{\partial y}$ and $\frac{\partial z}{\partial v} = \frac{\partial z}{\partial x} - \frac{\partial z}{\partial y}$; square and add.
18. Find $dz = e^{(y/x)}(1 - (y/x)) dx + e^{(y/x)} dy$
19. $y - z = 0$ and $y - z = 1$.