1. $\dfrac{1}{6}(5\sqrt{5} - 1)$

2. $\dfrac{(2)4^6}{5}$

3. Yes **F** is a conservative vector field and $f(x, y) = xe^{xy} + C$

4. Yes **F** is a conservative vector field and $f(x, y) = \dfrac{1}{2}x^2 y^2 + C$

5. $\dfrac{14}{3}$

6. 36π

7. curl $\mathbf{F} = \mathbf{0}$ and div $\mathbf{F} = y(x^2 + z^2)e^{xz}$. Since the curl is the zero vector **F** is conservative and $f(x, y, z) = ye^{xz} + C$

8. curl $\mathbf{F} = \mathbf{0}$ and div $\mathbf{F} = -x\sin y - y\cos z$. Since the curl is the zero vector **F** is conservative and $f(x, y, z) = x\sin y + y\cos z + C$

9. 0

10. $\dfrac{16}{3}$

11. $\dfrac{174}{35}$

12. 0

13. Use the fact that $\nabla(fg) = g\nabla f + f\nabla g$, the fact that div $(\mathbf{F} + \mathbf{G}) = $ div $\mathbf{F} + $ div $\mathbf{G}$ and then write out everything component wise.