1. For $y=x^3-3x$, find dy/dx at $x=2$.

   _____

2. Find the derivative of $(3x+1)^4$ at $x=0$.

   _____

3. Find the derivative of $\sin x$ at $x=0$.

   _____

4. For the worked f, find $f'(4)$.

   _____

5. For $p=2e^{(3x)}$, find $p'(0)$.

   _____

6. The derivative of $e^{(x^2)}$ is $e^{(x^2)}$ without an inner-rate factor.

   ☐ True ☐ False

7. Substitute a measured radius into the volume formula before differentiating it with respect to time.

   ☐ True ☐ False

8. Differentiating y^2 with respect to x gives 2y without a dy/dx factor.

   ☐ True ☐ False

9. A normal to a horizontal tangent has finite gradient zero.

   ☐ True ☐ False

10. A statement that the rate is proportional to the current amount means the same absolute change at all times.

    ☐ True ☐ False

1. **9.0**

   $dy/dx=3x^2-3$. At $x=2$ it is $12-3=9$.

2. **12.0**

   Chain rule gives $4(3x+1)^3\times3$; at zero this is 12.

3. **1.0**

   The sine proof gives $\cos0=1$.

4. **0.9375**

   $(3/2)/2+4/16-(1/2)/8=15/16$.

5. **6.0**

   Retain the coefficient 2 and inner rate 3: $6e^0=6$.

6. **False**

   Do not stop after differentiating the outer power or exponential. For $\sin(u^2)$, the cosine input stays u^2; it is not replaced by 2u. Missing one link in a nested derivative loses a factor. A zero inner derivative can give zero total derivative, so dividing by it without checking can lose valid cases. A square root can exist at an endpoint without a finite derivative there.

7. **False**

   Do not substitute the current radius or height before differentiating: that would falsely turn the relation into a constant. dV/dt is not dV/dr. A changing cone radius must follow the similarity relation, not stay fixed at its current value. Convert a per-minute inflow to a per-second rate before combining it with second-based data. Negative rate means decrease, not a negative length.

8. **False**

   Differentiating y^2 gives $2y\,y'$, not 2y or $2(y')^2$. The product xy needs both y and $x\,y'$. Verify a supplied point lies on the original relation before assigning its tangent. A zero denominator may indicate a vertical tangent or a singular point; the fraction alone cannot classify every case. For example $x^2+y^2=0$ has only one isolated real point, not a smooth circle tangent.

9. **False**

   The derivative supplies a gradient, not the y-coordinate. Use the original curve for the point. The normal's reciprocal includes a minus sign and is unavailable for a horizontal tangent; give a vertical line instead. A tangent can meet the curve again elsewhere. A given line's intercept does not affect a parallel-gradient condition, but both tangent and normal must pass through the stated curve point.

10. **False**

    Proportional rate is not constant absolute change. Fixed departures need a subtraction term, not a second multiplier of P. Do not replace a changing P with its initial value throughout the equation. An equilibrium solves

the rate-equals-zero condition; it need not equal the initial value or be approached from every start. A price derivative and a time derivative are different quantities with different units.