# Instructor key

Use after learners have made their own decisions. Equivalent correct forms are valid.

## 1. First error: line 2

Line 2 differentiates with respect to x but omits du/dx. Since du/dx = 6x^2, the outer derivative must be multiplied by 6x^2.

```
f'(x) = 24x^2(2x^3 - 5)^3
```

At x = 1 the derivative is -648; the proposed result is -108.

Domain: all real x

## 2. No error

No error. The cosine is evaluated at the whole inner expression, and the inner derivative 6x is included. Do not change correct work just because other examples contain mistakes.

```
f'(x) = 6x cos(3x^2 + 1)
```

The derivative is 0 at x = 0. That single value alone does not prove the formula.

Domain: all real x

## 3. First error: line 2

Line 2 uses a product of derivatives. The derivative of uv is u'v + uv'. Keep the undifferentiated factor in each term.

```
f'(x) = 2x cos(x) - x^2 sin(x)
```

At x = pi, the derivative is -2pi; the proposed result is 0.

Domain: all real x

## 4. First error: line 2

The product-rule structure in line 3 is consistent with line 2, but line 2 first goes wrong: v' needs the inner derivative 2. Locate that earlier mistake rather than blaming the product rule.

```
f'(x) = e^(2x) + 2x e^(2x)
```

At x = 1, the derivative is 3e^2; the proposed result is 2e^2.

Domain: all real x

Original R008 v1.0 | (c) 2026 InkDraft. Copy, adapt and share with this notice.
Full reuse terms: inkdraft.org/resources/r008-v1/LICENSE.txt
Paper alone is enough. No app, account or purchase required.

# Instructor key

Use after learners have made their own decisions. Equivalent correct forms are valid.

## 5. First error: line 2

Line 2 is missing the square on the denominator. The rule is (u'v - uv') / v^2, where v is nonzero. The numerator's order is already correct.

```
f'(x) = (x^2 - 4x - 1) / (x - 2)^2
```

At x = 0, the derivative is -1/4; the proposed result is 1/2.

Domain: x != 2

## 6. No error

No error, with u = 3x + 2 and v = x^2 + 1. Expanding the numerator gives 3x^2 + 3 - 6x^2 - 4x. The denominator is positive for every real x.

```
f'(x) = (-3x^2 - 4x + 3) / (x^2 + 1)^2
```

At x = 0, the derivative is 3.

Domain: all real x

## 7. First error: line 3

With u = x^2 - 4 and v = x + 1, lines 1 and 2 are correct. In line 3, subtracting (x^2 - 4) gives -x^2 + 4. The constant must be +4, not -4.

```
f'(x) = (x^2 + 2x + 4) / (x + 1)^2
```

At x = 0, the derivative is 4; the proposed result is -4.

Domain: x != -1

## 8. Clarification required

The raised 2 is between sin and x in this deliberately ambiguous copied note. Ask whether the writer means sin(x^2) or (sin(x))^2; ask them to rewrite it with parentheses. Do not select either reading from context or declare a unique derivative.

```
If sin(x^2): f'(x) = 2x cos(x^2).
If (sin(x))^2: f'(x) = 2 sin(x) cos(x).
```

Both conditional derivatives are valid. At x = 1 they are 2 cos(1) and 2 sin(1) cos(1), respectively, and are different.

Domain: all real x under either proposed reading

Original R008 v1.0 | (c) 2026 InkDraft. Copy, adapt and share with this notice.
Full reuse terms: inkdraft.org/resources/r008-v1/LICENSE.txt
Paper alone is enough. No app, account or purchase required.