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1 Nice Differentials And Evaluations In Integrals

$$\begin{aligned}\int_{x=0}^{x=3} x^2 \, \mathrm{d}x &= \left. \frac{1}{3}x^3 \right|_0^3 = 9 \\ \int_{x=0}^{x=3} x^2 \, \mathbf{d}x &= \left[\frac{1}{3}x^3 \right]_0^3 = 9 \\ \int_{x=0}^{x=3} \mathrm{d}x &= x \Big|_0^3 = 3 \\ \int_{x=0}^{x=3} \mathbf{d}x &= \left[x \right]_0^3 = 3 \\ \int_{r=0}^{r=R} r \, \mathrm{d}r \int_{\theta=0}^{\theta=\pi} \sin \theta \, \mathrm{d}\theta \int_{\phi=0}^{\phi=2\pi} \mathrm{d}\phi &= \left. \frac{1}{2}r^2 \right|_0^R \cdot \left. -\cos \theta \right|_0^\pi \cdot \left. \phi \right|_0^{2\pi} = 4\pi R^2 \\ \int_{r=0}^{r=R} r \, \mathbf{d}r \int_{\theta=0}^{\theta=\pi} \sin \theta \, \mathbf{d}\theta \int_{\phi=0}^{\phi=2\pi} \mathbf{d}\phi &= \left[\frac{1}{2}r^2 \right]_0^R \cdot \left[-\cos \theta \right]_0^\pi \cdot \left[\phi \right]_0^{2\pi} = 4\pi R^2\end{aligned}$$

2 Virtual Parentheses

Virtual Parentheses

$$\left(-G\frac{m_1m_2}{r}\right) \qquad -G\frac{(m_1m_2)}{r} \qquad -G\left(\frac{m_1m_2}{r}\right)$$

3 Derivation Environment

New derivation environment

$$E = \gamma mc^2 \tag{1}$$

| DERIVATION 1 | | |
|--|--|-------|
| $x + y = z$ | given | (1-1) |
| $y = z - x$ | solve for y | (1-2) |
| $a = b + c + d + e + f + g + k$ $+ l + m + n + o + p + q + r$ | a very long expression that came from nowhere | (1-3) |

$$E = h\nu \tag{2}$$

DERIVATION 2

$$\gamma = \frac{1}{\sqrt{1-v^2}} \quad \text{definition} \quad (2-1)$$

$$\gamma^2 = \frac{1}{1-v^2} \quad \text{square each side} \quad (2-2)$$

$$\frac{1}{\gamma^2} = 1 - v^2 \quad \text{take reciprocal of each side} \quad (2-3)$$

$$v = \sqrt{1 - \frac{1}{\gamma^2}} \quad \text{rearrange and solve for } v \text{ to get the final answer} \quad (2-4)$$

Going from Eq. (2-1) to Eq. (2-4) isn't trivial, but it's quite simple.

$$a^2 + b^2 = c^2 \quad (3)$$

DERIVATION 3

$$\gamma = \frac{1}{\sqrt{1-v^2}} \quad \text{definition} \quad (3-1)$$

$$\gamma^2 = \frac{1}{1-v^2} \quad \text{square each side} \quad (3-2)$$

$$\frac{1}{\gamma^2} = 1 - v^2 \quad \text{take reciprocal of each side} \quad (3-3)$$

$$v = \sqrt{1 - \frac{1}{\gamma^2}} \quad \text{rearrange and solve for } v \text{ to get the final answer} \quad (3-4)$$

DERIVATION 4

$$\gamma = \frac{1}{\sqrt{1-v^2}} \quad \text{definition} \quad (4-1)$$

$$\gamma^2 = \frac{1}{1-v^2} \quad \text{square each side} \quad (4-2)$$

$$\frac{1}{\gamma^2} = 1 - v^2 \quad \text{take reciprocal of each side} \quad (4-3)$$

$$v = \sqrt{1 - \frac{1}{\gamma^2}} \quad \text{rearrange and solve for } v \text{ to get the final answer} \quad (4-4)$$

DERIVATION 5

$$\gamma = \frac{1}{\sqrt{1-v^2}} \quad \text{definition} \quad (5-1)$$

$$\gamma^2 = \frac{1}{1-v^2} \quad \text{square each side} \quad (5-2)$$

$$\frac{1}{\gamma^2} = 1 - v^2 \quad \text{take reciprocal of each side} \quad (5-3)$$

$$v = \sqrt{1 - \frac{1}{\gamma^2}} \quad \text{rearrange and solve for } v \text{ to get the final answer} \quad (5-4)$$

DERIVATION 6

$$\gamma = \frac{1}{\sqrt{1-v^2}} \quad \text{definition} \quad (6-1)$$

$$\gamma^2 = \frac{1}{1-v^2} \quad \text{square each side} \quad (6-2)$$

$$\frac{1}{\gamma^2} = 1 - v^2 \quad \text{take reciprocal of each side} \quad (6-3)$$

$$v = \sqrt{1 - \frac{1}{\gamma^2}} \quad \text{rearrange and solve for } v \text{ to get the final answer} \quad (6-4)$$

DERIVATION 7

$$\gamma = \frac{1}{\sqrt{1-v^2}} \quad \text{definition} \quad (7-1)$$

$$\gamma^2 = \frac{1}{1-v^2} \quad \text{square each side} \quad (7-2)$$

$$\frac{1}{\gamma^2} = 1 - v^2 \quad \text{take reciprocal of each side} \quad (7-3)$$

$$v = \sqrt{1 - \frac{1}{\gamma^2}} \quad \text{rearrange and solve for } v \text{ to get the final answer} \quad (7-4)$$

DERIVATION 8

$$\gamma = \frac{1}{\sqrt{1-v^2}} \quad \text{definition} \quad (8-1)$$

$$\gamma^2 = \frac{1}{1-v^2} \quad \text{square each side} \quad (8-2)$$

$$\frac{1}{\gamma^2} = 1 - v^2 \quad \text{take reciprocal of each side} \quad (8-3)$$

$$v = \sqrt{1 - \frac{1}{\gamma^2}} \quad \text{rearrange and solve for } v \text{ to get the final answer} \quad (8-4)$$

DERIVATION 9

$$\gamma = \frac{1}{\sqrt{1-v^2}} \quad \text{definition} \quad (9-1)$$

$$\gamma^2 = \frac{1}{1-v^2} \quad \text{square each side} \quad (9-2)$$

$$\frac{1}{\gamma^2} = 1 - v^2 \quad \text{take reciprocal of each side} \quad (9-3)$$

$$v = \sqrt{1 - \frac{1}{\gamma^2}} \quad \text{rearrange and solve for } v \text{ to get the final answer} \quad (9-4)$$

DERIVATION 10

$$\gamma = \frac{1}{\sqrt{1-v^2}} \quad \text{definition} \quad (10-1)$$

$$\gamma^2 = \frac{1}{1-v^2} \quad \text{square each side} \quad (10-2)$$

$$\frac{1}{\gamma^2} = 1 - v^2 \quad \text{take reciprocal of each side} \quad (10-3)$$

$$v = \sqrt{1 - \frac{1}{\gamma^2}} \quad \text{rearrange and solve for } v \text{ to get the final answer} \quad (10-4)$$

$$E_K = \frac{\|\mathbf{p}\|^2}{(\gamma + 1)m} \quad (4)$$

This equation won't be listed.

$$E^2 = \|\mathbf{p}\|^2 c^2 + (mc^2)^2 \quad (5)$$

4 Current Math Fonts

symnormal: for vector index notation
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
αβγδεζηθικλμνξοπρρσςτυφφχψωΔΓΘΛΞΠΣΥΦΨΩ

symbf: for coordinate-free vectors and matrices
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ
αβγδεζηθικλμνξοπρρσςτυφφχψωΔΓΘΛΞΠΣΥΦΨΩ

symup: for text labels, particles, and upright Greek
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
αβγδεζηθικλμνξοπρρσςτυφφχψωΔΓΘΛΞΠΣΥΦΨΩ

symbfup: for bold text labels
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
αβγδεζηθικλμνξοπρρσςτυφφχψωΔΓΘΛΞΠΣΥΦΨΩ

symsfup: for physical dimensions
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
αβγδεζηθικλμνξοπρρσςτυφφχψωΔΓΘΛΞΠΣΥΦΨΩ

symsfit: for tensor index notation
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ
αβγδεζηθικλμνξοπρρσςτυφφχψωΔΓΘΛΞΠΣΥΦΨΩ

symbfsfup: available if needed
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
αβγδεζηθικλμνξοπρρσςτυφφχψωΔΓΘΛΞΠΣΥΦΨΩ

symsfit: for tensor index notation
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ
αβγδεζηθικλμνξοπρρσςτυφφχψωΔΓΘΛΞΠΣΥΦΨΩ

symbfsfit: for coordinate-free tensors
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ
αβγδεζηθικλμνξοπρρσςτυφφχψωΔΓΘΛΞΠΣΥΦΨΩ

symcal and symbfcal: for naming points and coordinate systems
ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ

symscr and symbfscr: for naming spacetime events
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ

symtt: available if needed
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789

symfrac and symbfrac: available if needed
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ

symbb and symbbit: available if needed
abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
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