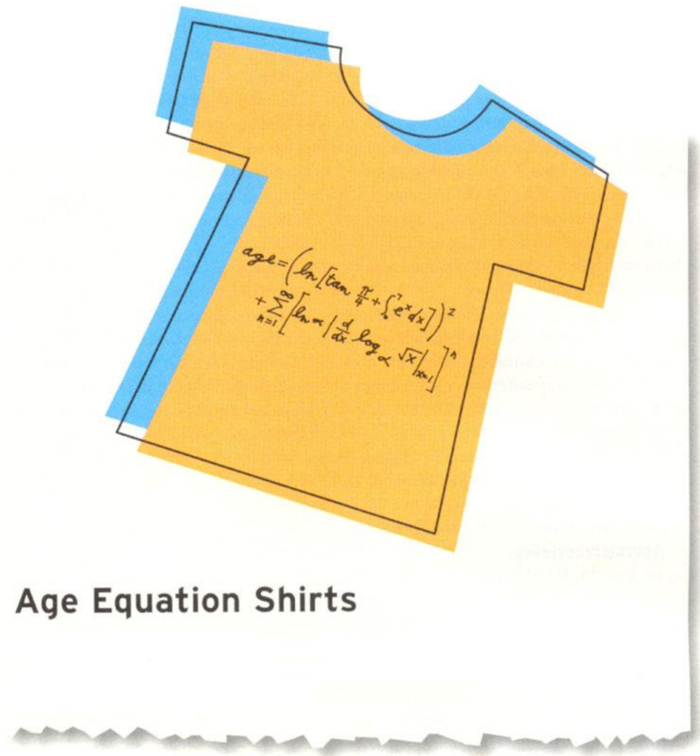

Source: Signals Holiday 2003 catalog

Idea from James Greenwood, University of Hartford, West Hartford, CT
In the MATHEMATICS TEACHER December 2005/January 2006
Puzzle by David Pleacher

Can you match the age on the thirteen tee-shirts on the next page with the person who would be sporting it on page three?

Then see if you can determine the quote about age from George Burns by replacing each numbered blank below with the letter or symbol corresponding to the answer for that problem. The unnumbered blanks are all vowels.

__	__	__		__	__	__	'__		__	__	__	__		__	__	__	__	__	__	__
11				1		10	12		8		9	2		4		12	12		10	4

__	__	__	__	__,		__	__	__		__	__	__		__	__	__	'__
	9	5		6		3		12		11				5		10	12

__	__	__	__		__	__		__	__	__		__	__	__	__
8		7			12			4		12			9	5	13

To solve the puzzle, you must first work out the thirteen derivative problems below.
Then you must find the ages at which the celebrities on the next page accomplished their feats.
Then you must match up these ages!
The ages used in this puzzle are: 21, 27, 38, 42, 43, 48, 55, 59, 60, 62, 65, 70, and 75.

Tee Shirt Ages

1. Determine $g'(-1)$ if $g(x)=5\left(4x-x^5\right)\left(x^2-3x\right)$
2. Determine $f'(2)$ if $f(x)=5x^4\cos^2\left(3x-6\right)-25x^2$
3. Determine $y'(0)$ given $y=-13e^{\sin\left(4x^2-5x\right)}$
4. Determine the value of $-62\left(g'(3)\right)$ if $g(3)=9$ and $3x\,g(x)+6\sqrt{g(x)}=4\left(g(x)\right)^2+48x$
5. Determine $h'(0)$, given $h(x)=9\sin\left(4x\right)-3e^{3x}$
6. Determine $\left.\dfrac{dy}{dx}\right|_{x=3}$ if $y=42\ln\left(15x^2-3x\right)+9x$
7. Given $y^4-5y=700-350x$, Determine $\dfrac{dy}{dx}$ at the point $(2,0)$
8. Given $f(x)=62x-\cos x+x\sin\left(x^3\right)$, Determine $f'(0)$
9. Determine $k'(1)$ given $k(x)=8x^5+3x\sin\left(2\pi\right)+\dfrac{6}{x^2}+8e^3-\dfrac{4}{x+1}+15x^2$
10. If $h(t)=\pi^2+t^3+e^{\pi}$, Determine $\dfrac{dh}{dt}$ at $t=4$
11. If $s=-43\ln\sqrt{t^2+2t-1}$, Determine $\left.\dfrac{ds}{dt}\right|_{t=0}$

12 – 13 Use the following table to answer questions #12 and #13:

x	f(x)	f'(x)	g(x)	g'(x)
1	3	4	5	7
5	2	6	5	1

12. If $M(x)=f\left(g\left(x\right)\right)$, Then determine the value of $M'(1)$
13. If $H(x)=\left(g(x)\right)^3$, Then determine the value of $H'(5)$

Accomplishments at Certain Ages

B. Age at which Laura Ingalls Wilder published her first novel.

C. Age at which Ronald Reagan was elected to his first public office (as Governor of California).

D. Jimi Hendrix, Janis Joplin, Jim Morrison, Kurt Cobain, & Amy Winehouse all died at this age.

G. The age at which college dropout Steve Jobs co-founded Apple Computer.

H. J.R.R. Tolkein published the first volume of his fantasy series, *Lord of the Rings*, when he was this age.

L. Clara Barton founded the American Red Cross at this age.

N. George Blanda played his last year of N.F.L. football at this age.

P. Playwright and essayist George Bernard Shaw completed the play *Heartbreak House* at this age, and many consider it his masterpiece.

R. Apollo 11 Commander Neil Armstrong became the first person to set foot on the moon, and he did it at this age!

T. The age at which Elvis Presley died.

V. Benjamin Franklin helped draft the Declaration of Independence at this age.

Y. John F. Kennedy became the youngest man elected to the U.S. Presidency when he was this age (Note: Theodore Roosevelt was sworn in after the assassination of William McKinley and was a year younger than Kennedy when he took office).

! The age at which Grandma Moses painted her first canvas.

BONUS: Can you determine the age on the tee-shirt in the *Signals* Holiday 2003 catalog above?

$$\text{Age} = \left(\ln\left[\tan\frac{\pi}{4} + \int_0^7 e^x dx \right] \right)^2 + \sum_{n=1}^{\infty} \left[\ln\alpha \left| \frac{d}{dx} \log_a \sqrt{x} \right|_{x=1} \right]^n$$