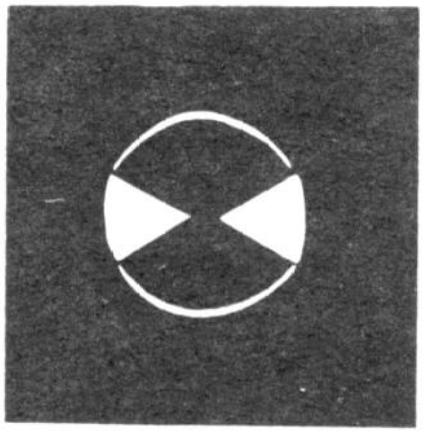
Droodle for Calculus 1st Semester Exam

A Puzzle by David Pleacher

Can you name this droodle?



Back in 1953, Roger Price invented a minor art form called the Droodle, which he described as "a borkley-looking sort of drawing that doesn't make any sense until you know the correct title." The droodle above was drawn by Roger Price and published in his book called, *Droodles*.

To determine the title to this droodle, you must first solve the problems in the puzzle and find the corresponding answers. Then replace each numbered blank in the puzzle with the letter corresponding to the answer for that problem and that will give you the title.

Title:

T	H	E		O	U	T	S	I	D	E		W	O	R	L	D		A	S
11	13	21		4	17	11	9	24	16	6		18	4	1	15	16		22	9

S	E	E	N		B	Y		A		M	A	N		L	I	V	I	N	G
9	21	25	2		3	19		12		5	23	7		15	24	10	24	20	14

I	N		A		B	E	E	R		C	A	N	.
24	20		23		3	25	6	1		8	22	7	

Here are the choices for your answers:

A. -14

A. -2

A. $-\frac{1}{11}$

B. -1

B. 0

C. 1

D. 2 and 6

E. $\frac{4}{3}$

E. $\frac{5}{4}$

E. $\frac{12}{7}$

G. $-\frac{12}{5}$

H. 3

I. 4

K. 31.2

L. 10

M. $\frac{40}{3}$

N. 21.63

N. $+\infty$

N. $\frac{-6}{(3x-1)^2}$

O. $\frac{6x^2+1}{6x^2-1}$

O. $\frac{1}{x\ln 10}$

P. $3\cdot 5^{3x}$

R. $\frac{\pi}{x^2}\tan\left(\frac{\pi}{x}\right)$

R. $\frac{3y-x}{y-x}$

S. $\frac{y-x}{3y-x}$

S. 4x + 7y = 20

T. 4x + 7y = 36

U. $5^{3x}\ln 125$

V. $\sec x\tan x-\csc x\cot x$

W. $-3\cos^2(\pi+1)\sin(\pi+1)$

X. $3\cos^2(\pi+1)\sin(\pi+1)$

X. $-\frac{1}{\ln(1-x)}$

Y. $-\frac{1}{(1-x)\ln(1-x)}$

Y. $\sec x\tan x+\csc x\cot x$

Z. None of the above

R 1. Determine $\frac{d}{dx}\left(\ln\left|\cos\frac{\pi}{x}\right|\right)$

N 2. Determine $\lim_{x\to\infty}\left(\ln(x-1)\right)$

B 3. Determine $\lim_{x\to 2}\left(\ln(x-1)\right)$

O 4. Determine the derivative of $f(x)=\log_{10} x$

M 5. If $f(x)=5x^{\frac{4}{3}}$, Then $f'(8)=$

E 6. $\lim_{x\to\infty}\frac{5x^2-3x+1}{4x^2+2x+5}=$

N 7. If $f(x)=\frac{3x^2+x}{3x^2-x}$, then $f'(x)=$

C 8. If the function f is continuous for all real numbers and if $f(x)=\frac{x^2-7x+12}{x-4}$ when x ≠ 4, then f(4) =

_S_ 9. If $x^2 - 2xy + 3y^2 = 8$, then $\frac{dy}{dx} =$

_V_ 10. If $f(x) = \sec x + \csc x$, then $f'(x) =$

_T_ 11. Determine the equation of the normal line to the graph of $y = \sqrt{\left(3x^2 + 2x\right)}$ at (2, 4).

_A_ 12. If $f(x) = \cos^2 x$, then $f''(\pi) =$

_H_ 13. If $f(x) = \frac{5}{x^2 + 1}$ and $g(x) = 3x$ then $g\left(f(2)\right) =$

_G_ 14. Determine the slope of the line tangent to the graph of $3x^2 + 5\ln y = 12$ at (2, 1).

_L_ 15. For what value of x does the function $f(x) = x^3 - 9x^2 - 120x + 6$ have a local minimum?

_D_ 16. If the position of a particle is given by $x(t) = t^3 - 12t^2 + 36t + 18$, where $t > 0$, determine the point t at which the particle changes direction.

_U_ 17. If $f(x) = 5^{3x}$, then $f'(x) =$

W 18. If $f(x)=\cos^3(x+1)$, then $f'(\pi)=$

Y 19. If $f(x)=\ln(\ln(1-x))$, then $f'(x)=$

N 20. Boats A and B leave the same place at the same time. Boat A heads due north at 12 km/hr. Boat B heads due east at 18 km/hr. After 2.5 hours, how fast is the distance between the boats increasing (in km/hr)?

E 21. $\lim_{h\to 0}\dfrac{\tan\left(\frac{\pi}{6}+h\right)-\tan\left(\frac{\pi}{6}\right)}{h}=$

A 22. If the function f(x) is differentiable and

$$f(x)=\begin{cases} ax^3-6x; & x\le 1 \\ bx^2+4; & x>1 \end{cases}, \quad \text{then } a=$$

A 23. Determine $\lim_{x\to\infty}\dfrac{-3x^{10}-70x^5+x^3}{33x^{10}+200x^8-1000x^4}$

I 24. Determine $\lim_{x\to 0}\dfrac{4x}{\tan x}$

E 25. Determine the derivative of $3x^2-4y^2+y=9$ at (2, 1).