

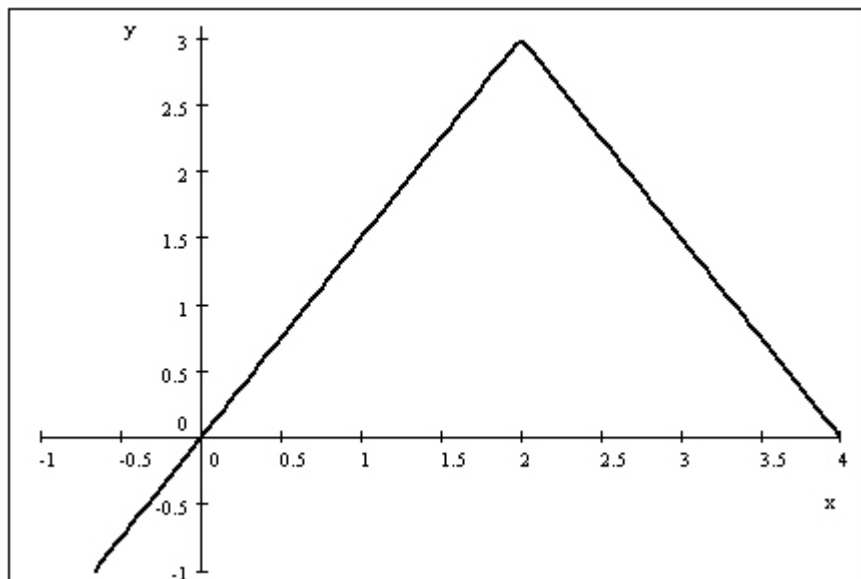
2018 Calculus Bee
Monday, April 9, 2018

1st Place	Bao Thach
2nd Place	Hy Dang
3rd Place	Think Doan

- (1) Find the point (x, y) on the graph of $y = 2017x^2$ where the slope of the tangent line is 2018.
- (2) Find $\int ze^{2018z} dz$.
- (3) Find $\frac{d}{d\theta} (\sin(\cos(\tan 2018\theta)))$.
- (4) Evaluate $\int_{-2018}^{2018} \sin^{45} x dx$.
- (5) Find

$$\lim_{x \rightarrow \infty} \frac{2^x + x^{2018}}{2^{x+1} + 3x^{2018}}.$$

- (6) Find the volume of the solid produced by revolving the region between $y = 2018\sqrt{x}$ and $y = 2018x$ around the x -axis.
Your answer does not need to be simplified.
- (7) Find the sum $\sum_{n=0}^{\infty} \frac{1}{2018^n}$, or determine that it diverges.
- (8) Find the minimum value of the function $x^2 + e^{-x}$ on the interval $[-2018, 0]$.
- (9) The **derivative** of the function F is graphed below.



Suppose that $F(0) = 0$. Find $F(3) + F'(3)$.

- (10) Compute

$$\int_0^{\pi/4} \frac{\sin^2 z - \cos^2 z}{\sin^2 z + \cos^2 z} dz.$$