Motion and L'Hopital Wrap Up

Name

1.

$$\lim_{x\to\infty}\frac{\ln(e^{3x}+x)}{x} = \lim_{x\to\infty}\frac{1}{e^{3x}+x}\cdot(e^{3x}\cdot 3+1)$$

$$= \lim_{x\to\infty}\frac{9e^{3x}}{3e^{3x}+1}$$

$$= \lim_{x\to\infty}\frac{27e^{3x}}{9e^{3x}} = 3$$

(A) 0

(B) 1

(C) 3

(D) ∞

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2. $\lim_{x\to\frac{\pi}{2}}\frac{3\cos x}{2x-\pi}$ is

$$= \lim_{x\to\frac{\pi}{2}}\frac{-3\sin x}{2} = -\frac{3}{2}$$

(A) $-\frac{3}{2}$

(B) 0

(C) $\frac{3}{2}$

(D) nonexistent

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3. $\lim_{x\to 0}\frac{6e^{4x}-2e^{3x}-4}{\sin(2x)} =$

$$\frac{24e^{4x}-6e^{3x}}{2\cos(2x)}$$

2, 4, 9, 18

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A 2

B 4

C 9

D 18

4. If the position of a particle on the x-axis at time t is $-5t^2$, then the average velocity of the particle for $0 \le t \le 3$ is

$v = -10t$

$v(0) = 0 \quad v(3) = -30$

$\frac{-30}{3} = -10 \text{ m/s}$

A -45

B -30

C -15

D -10

E -5

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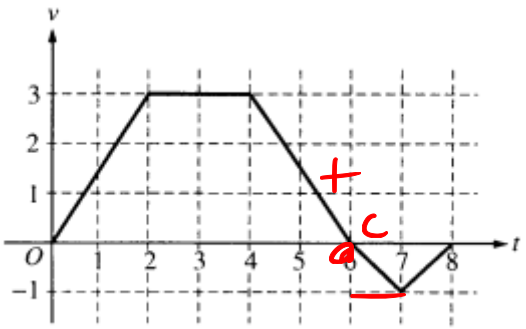
5.



A bug begins to crawl up a vertical wire at time $t = 0$. The velocity v of the bug at time t, $0 \le t \le 8$, is given by the function whose graph is shown above.
At what value of t does the bug change direction?

(A) 2

(B) 4

(C) 6

(D) 7

(E) 8