

PreCalculus Honors

Name: _____

Dr. Quattrin

Limits and Derivatives Test

CALCULATOR ALLOWED

Score _____

Round to 3 decimal places. Show all work.

1. $\lim_{x \rightarrow 2} \frac{x^2 + 2x - 8}{x^2 - 4} =$

- (a) -2 (b) -1.5 (c) 10 (d) 1.5 (e) 2.5

2. The slope of the line tangent to $y = x^3 - 4x$ at $(-1, 3)$ is

- (a) 3 (b) 23 (c) -1 (d) -5 (e) -3

3. What is the equation of the line tangent to $y = x^4 + 2x^2$ at the point where $f'(x) = 1$?

- (a) $y = 8x - 5$ (b) $y = x + 7$ (c) $y = x + .763$
(d) $y = x - .122$ (e) $y = x - 2.146$

4. At what point on the graph of $y = \frac{1}{3}x^3$ is the tangent parallel to the line $2x - 8y = 3$

- (a) $\left(\frac{1}{2}, -\frac{1}{2}\right)$ (b) $\left(\frac{1}{2}, \frac{1}{8}\right)$ (c) $\left(\frac{1}{2}, \frac{1}{24}\right)$
(d) $\left(1, -\frac{1}{2}\right)$ (e) $(2, 2)$

5. If $f(x) = \sqrt{x^2 - 4}$, which of the following is equal to $f'(2)$?

I. $\lim_{x \rightarrow 2} \frac{\sqrt{x^2 - 4} - \sqrt{8}}{x - 2}$ II. $\lim_{x \rightarrow 2} \frac{\sqrt{x^2 - 4}}{x - 2}$

III. $\lim_{h \rightarrow 0} \frac{\sqrt{(2+h)^2 - 4} - \sqrt{2^2 - 4}}{h}$

- a. I only b. II only c. III only
d. II and III only e. I, II and III

6. A particle moves in the xy -plane so that its coordinates at time t are $x = t^2$ and $y = 4 + t^3$. At $t = 1$, the acceleration vector is

- (a) $\langle 2, -3 \rangle$ (b) $\langle 2, -6 \rangle$ (c) $\langle 1, 6 \rangle$
(d) $\langle 2, 6 \rangle$ (e) $\langle 1, -2 \rangle$

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1. A particle's position $\langle x(t), y(t) \rangle$ at time t is described by $\langle t^3 - 6t^2 + 9t + 1, -t^2 + 6t + 2 \rangle$. When is the particle moving right and down?

2. The motion of a particle is described by $x(t) = t^3 - 6t^2 + 9t + 1$.

- a) When the particle is stopped?
- b) Which direction it is moving at $t = 3$?
- c) Where is it when $t = 3$?
- d) Find $a(3)$.

PreCalculus

Limits and Derivatives Test v4

NO CALCULATOR ALLOWED

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3. Set up, but do not solve, the limit definition of the derivative for
 $y = 6x^4 - 2x^3 + \pi^2 + 4x$

4. $D_x \left[\sqrt[4]{x^3} + \frac{9}{x^2} - 2\sqrt[4]{x^9} - \pi^2 \right]$

5. Evaluate the following limits:

(a) $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x^2 + 3x - 4}$

(b) $\lim_{x \rightarrow -3} \frac{x^2 + 7x + 12}{x^2 - 8}$