Honors PreCalculus '11-12 Name:_____

Limits and Derivatives Test

CALCULATOR ALLOWED Score _____

Round to 3 decimal places. Show all work.

1. $\lim_{x \to 1} \frac{\sqrt{x} - 1}{x - 1}$

(a) 0 (b) $\frac{1}{2}$ (c) 1 (d) $\frac{3}{2}$ (e) does not exist

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

(a) 10 (b) 8 (c) 6 (d) 4 (e) 3

3. Let $f(x) = -x^3 + x + \frac{1}{x}$, then $f'(-1) =$

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

Free Response

4. A particle's position $\langle x(t), y(t) \rangle$ at time t is described by $x(t) = 2t^2 + 5t - 12$, $y(t) = 2t^3 + t^2 - 13t + 6$. When is the [particle moving right and down?

5. The motion of a particle is described by $x(t) = 4t^3 - 63t^2 + 86t - 14$.

a) When the particle is stopped?
b) Which direction it is moving at $t = 7$?
c) Where is it when $t = 7$?
d) Find $a(7)$.

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Multiple Choice (3 pts. each)

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

(a) $\left(\frac{1}{2},-\frac{1}{2}\right)$ (b) $\left(\frac{1}{2},\frac{1}{8}\right)$ (c) $\left(\frac{1}{2},-\frac{1}{4}\right)$

(d) $\left(1,-\frac{1}{2}\right)$ (e) $(2,2)$

7. If $f(x)=\sqrt{x^2-1}$, which of the following is equal to $f'(3)$?

(a) $\lim\limits_{x\to 3}\dfrac{\sqrt{(x+h)^2-1}-\sqrt{8}}{x-3}$ (b) $\lim\limits_{h\to 0}\dfrac{\sqrt{(x+h)^2-1}-\sqrt{x^2-1}}{h}$

(c) $\lim\limits_{h\to 0}\dfrac{\sqrt{(x+h)^2-1}-\sqrt{8}}{h}$ (d) $\lim\limits_{x\to 3}\dfrac{\sqrt{x^2-1}-\sqrt{8}}{x-3}$

(e) $\lim\limits_{h\to 0}\dfrac{\sqrt{x^2-1}-\sqrt{8}}{x-3}$

8. A particle moves along a straight line such that its position is given by $s=4t^3-9t^2+6t+2$ for $t\geq 0$. When is the particle at rest?

(a) $t=\frac{1}{2}$ (b) $t=1$ (c) $t=0$

(d) $t=0,\frac{1}{2}$ (e) $t=\frac{1}{2},1$

9. Set up, but do not solve, the limit definition of the derivative for $f(x)=13x^3+3x+4021$

10. Evaluate the following limits:

(a) $\lim_{x\to 2}\dfrac{\sqrt{x+2}-\sqrt{2x}}{x^2}$

(b) $\lim_{x\to 3}\dfrac{x^2-9}{x^2-2x-3}$

11. $D_x\left[16x^{15}-18x^2+41x+e+2+\dfrac{3}{\sqrt{x^3}}+\dfrac{1}{x}\right]$