Student: Key **Date:**	**Instructor:** Joe Betters **Course:** Pre-Calculus Pre AP (Master Course)	**Assignment:** 14.2 HW 2020 (Adjusted)

1. Find the limit algebraically.

$\lim_{x \to 8} 3$

limit as $x \to 8$ of 3 is $\boxed{3}$

Select the correct choice below and, if necessary, fill in the answer box within your choice.

○ **A.** $\lim_{x \to 8} 3 = \boxed{3}$ (Simplify your answer.)

○ **B.** The limit does not exist.

ID: 14.2.7

2. Find the limit algebraically.

$\lim_{x \to 1} \left(5x^4\right)$

* substitute in 1 for x

Select the correct choice below and, if necessary, fill in the answer box within your choice.

○ **A.** $\lim_{x \to 1} \left(5x^4\right) = \boxed{5}$ (Simplify your answer.)

○ **B.** The limit does not exist.

$5x^4$

$5(1)^4 = \boxed{5}$

ID: 14.2.13

3. Find the limit algebraically.

$\lim_{x \to -1} \left(6x^4 - 8x^2 - 2x + 9\right)$

* substitute in −1 for x

Select the correct choice below and, if necessary, fill in the answer box within your choice.

○ **A.** $\lim_{x \to -1} \left(6x^4 - 8x^2 - 2x + 9\right) = \boxed{9}$ (Simplify your answer.)

○ **B.** The limit does not exist.

$6(-1)^4 - 8(-1)^2 - 2(-1) + 9 = \boxed{9}$

ID: 14.2.19

4. Find the limit algebraically.

$$\lim_{x \to 3} \sqrt{6x-2}$$

*substitute in 3 for x

Select the correct choice below and, if necessary, fill in the answer box within your choice.

○ A. $\lim_{x \to 3} \sqrt{6x-2} = \boxed{4}$ (Type an exact answer, using radicals as needed.)

○ B. The limit does not exist.

$\sqrt{6(3)-2} = \sqrt{16} = \boxed{4}$

ID: 14.2.23

5. Find the limit algebraically.

$$\lim_{x \to 5} (4x-16)^{\frac{3}{2}}$$

*substitute in 5 for x

Select the correct choice below and, if necessary, fill in the answer box within your choice.

○ A. $\lim_{x \to 5} (4x-16)^{\frac{3}{2}} = \boxed{8}$ (Type an exact answer, using radicals as needed.)

○ B. The limit does not exist.

$\sqrt{((4(5)-16)^3} = \sqrt{(4)^3} = \sqrt{64} = \boxed{8}$

ID: 14.2.27

6. Find the limit algebraically.

$$\lim_{x \to -3} \frac{x^2-9}{x^2+3x}$$

* since denominator will equal zero, * factor

Select the correct choice below and, if necessary, fill in the answer box within your choice.

○ A. $\lim_{x \to -3} \frac{x^2-9}{x^2+3x} = \boxed{2}$ (Simplify your answer.)

○ B. The limit does not exist.

$\frac{\cancel{(x+3)}(x-3)}{x\cancel{(x+3)}}$

ID: 14.2.29

$\frac{x-3}{x}$ substitute in (-3) for x

$\frac{-3-3}{-3} = \boxed{2}$

7. Find the limit algebraically.

$$\lim_{x \to 3} \frac{x^3 - 3x^2 + 8x - 24}{x^2 + x - 12}$$

* Since the denominator equals zero, factor *

Select the correct choice below and, if necessary, fill in the answer box within your choice.

○ A. $\lim_{x \to 3} \frac{x^3 - 3x^2 + 8x - 24}{x^2 + x - 12} = \boxed{17/7}$ (Simplify your answer.)

○ B. The limit does not exist.

ID: 14.2.39

$$\frac{x^2(x-3)+8(x-3)}{(x+4)(x-3)}$$

$$\frac{(x^2+8)\cancel{(x-3)}}{(x+4)\cancel{(x-3)}} = \frac{3^2+8}{3+4}$$

sub in 3 for x

8. Find the limit as x approaches c of the average rate of change of the function from c to x.

c = 1; f(x) = 5x − 6

$\lim_{x \to 1} \frac{\Delta y}{\Delta x} = \boxed{5}$

ID: 14.2.43

$$\frac{f(x)-f(\text{limit})}{x-\text{limit}} = \frac{(5x-6)-(5(1)-6)}{x-1}$$

$$\frac{5x-6+1}{x-1} = \frac{5\cancel{(x-1)}}{\cancel{(x-1)}} = 5$$

9. Find the limit as x approaches 8 of the average rate of change of the following function from 8 to x.

f(x) = $x^2 + 7x$

The limit of the average rate of change of the function from 8 to x is $\boxed{23}$.
(Type an integer or a fraction.)

ID: 14.2.47

$$\frac{f(x)-f(\text{limit})}{x-\text{lim}} = \frac{(x^2+7x)-(8^2-7(8))}{x-8}$$

$$\frac{x^2+7x-120}{x-8} = \frac{\cancel{(x-8)}(x+15)}{\cancel{(x-8)}}$$

$8+15=23$

10. Find the limit as x approaches 7 of the average rate of change of the following function from 7 to x.

$f(x) = \frac{-4}{x}$

$\boxed{4/49}$ (Enter an integer or fully reduced fraction.)

ID: 14.2.51

$$\frac{f(x)-f(\text{limit})}{x-\text{lim}} = \frac{\frac{-4}{x}-\frac{-4}{7}}{x-7} = \frac{\frac{-28+4x}{7x}}{x-7}$$

$$= \frac{-28+4x}{7x(x-7)}$$

$$= \frac{4\cancel{(x-7)}}{7x\cancel{(x-7)}} = \frac{4}{7x}$$

$$= \frac{4}{7(7)}$$

$$= 4/49$$

11. Use the properties of limits and the facts that $\lim_{x\to 0} \frac{\sin(x)}{x} = 1$, $\lim_{x\to 0} \frac{\cos(x)-1}{x} = 0$, $\lim_{x\to 0} \sin(x) = 0$, and $\lim_{x\to 0} \cos(x) = 1$, where x is in radians, to find the limit.

$$\lim_{x\to 0} \frac{\tan(2x)}{x}$$

$$\frac{\tan 2x}{x} = \frac{\sin 2x}{x \cos 2x} = \frac{2 \sin x \cos x}{x \cos 2x}$$

$$* \frac{\sin x}{x} = 1 \qquad \frac{2(1)\cos x}{\cos 2x}$$

$$\frac{2\cos 0}{\cos 2(0)} = \boxed{2}$$

$\lim_{x\to 0} \frac{\tan(2x)}{x} =$ $\boxed{2}$

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12. Use the properties of limits and the facts that

$\lim_{x\to 0} \frac{\sin x}{x} = 1$ $\quad \lim_{x\to 0} \frac{\cos x - 1}{x} = 0$ $\quad \lim_{x\to 0} \sin x = 0$ $\quad \lim_{x\to 0} \cos x = 1$

where x is in radians, to find the following limit.

$$\lim_{x\to 0} \frac{8 \sin x + \cos x - 1}{-2x}$$

$\boxed{-4}$

(Type your answer as an integer or as a fully reduced fraction.)

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$$\frac{8\sin x + \cos x - 1}{-2x}$$

$$\frac{8 \sin x}{-2x} + \frac{1}{-2}\left(\frac{\cos x - 1}{x}\right)$$

$$\frac{-4 \sin x}{x} + -\frac{1}{2}\left(\frac{\cos x - 1}{x}\right)$$

$$=1 \qquad\qquad =0$$

$$-4 + -\frac{1}{2}(0)$$

$$= \boxed{-4}$$

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3. A. $\lim_{x\to -1} \left(6x^4 - 8x^2 - 2x + 9\right) = \boxed{9}$ (Simplify your answer.)

4. A. $\lim_{x\to 3} \sqrt{6x-2} = \boxed{4}$ (Type an exact answer, using radicals as needed.)

5. A. $\lim_{x\to 5} (4x-16)^{\frac{3}{2}} = \boxed{8}$ (Type an exact answer, using radicals as needed.)

6. A. $\lim_{x\to -3} \dfrac{x^2-9}{x^2+3x} = \boxed{2}$ (Simplify your answer.)

7. A. $\lim_{x\to 3} \dfrac{x^3-3x^2+8x-24}{x^2+x-12} = \boxed{\dfrac{17}{7}}$ (Simplify your answer.)

8. 5

9. 23

10. $\dfrac{4}{49}$

11. 2

12. -4