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AP Calculus: Review Unit 1A

1. Which of the following best describes the graph of $y = x^3 - 4x + 20$. 1. C

A. Line B. Parabola C. Cubic

D. Hyperbola E. Semi-circle

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2. Find the increments Δx and Δy for a particle that travels from A(5, -7) to B(-3, 9).

$\Delta x = x_2 - x_1 = -3 - 5 = -8$, $\Delta y = y_2 - y_1 = 9 - (-7) = 16$

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3. Find the slope of the line that contains the points (-7, -5) and (4, -2).

$m = \frac{\Delta y}{\Delta x} = \frac{-2-(-5)}{4-(-7)} = \boxed{\frac{3}{11}}$

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4. Find an equation for the line through the point (5, -2) with a slope of -2/3. Write the answer in slope-intercept form. $y = mx+b$

$y = m(x - x_1) + y_1$, $y = -\frac{2}{3}x + \frac{10}{3} - \frac{6}{3}$

$y = -\frac{2}{3}(x-5) - 2$ $\boxed{y = -\frac{2}{3}x + \frac{4}{3}}$

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5. Find the equation of the line through the point (8,-2) that is (a) parallel to and (b) perpendicular to the line $y = \frac{3}{4}x + 7$. (a) $m = \frac{3}{4}$ (8,-2) (b) $m = -\frac{4}{3}$ (8,-2)

$\boxed{y = \frac{3}{4}(x-8) - 2}$ $\boxed{y = -\frac{4}{3}(x-8) - 2}$

$Ax + By = C$

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6. Write a general linear equation for the line through the points (7,-8) and (5, 12).

① $m = \frac{12-(-8)}{5-7} = \frac{20}{-2} = -10$ ② $m = -10$, (5, 12)

$y = -10(x-5) + 12$

$y = -10x + 50 + 12$

$\boxed{y = -10x + 62}$

$\boxed{10x + y = 62}$

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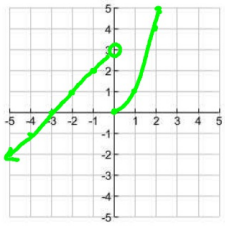
For questions 7 - 10 use $f(x) = \begin{cases} x^2, & x \geq 0 \\ x+3, & x < 0 \end{cases}$

7. Find $f(3)$ 8. Find $f(0)$ 9. Find $f(-2)$

$f(3) = (3)^2 = \boxed{9}$ $f(0) = 0^2 = \boxed{0}$ $f(-2) = -2 + 3 = \boxed{1}$

10. Graph $y = f(x)$



$(\sqrt{x+5})^2 - \sqrt{25}$

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11. Factor $(x-6)^2 - 2(x-6) - 3$ → $m^2 - 2m - 3$ $= (x-6-3)(x-6+1)$

$m = x - 6$ $= (m-3)(m+1)$ $= \boxed{(x-9)(x-5)}$

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12. Rationalize $\frac{5x}{\sqrt{x+5} - \sqrt{5}} \cdot \frac{\sqrt{x+5} + \sqrt{5}}{\sqrt{x+5} + \sqrt{5}}$ $= \frac{5x(\sqrt{x+5} + \sqrt{5})}{x+5-5}$ $= \frac{5x(\sqrt{x+5} + \sqrt{5})}{x}$

$= 5(\sqrt{x+5} + \sqrt{5})$

$= 5\sqrt{x+5} + 5\sqrt{5}$

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13. What happens to the graph of $y = x^{2/5}$ at the origin? 13. B

A) It goes vertical. B) It forms a cusp. C) It goes horizontal. D) It stops at zero.

0/0 even/odd

% odd/even

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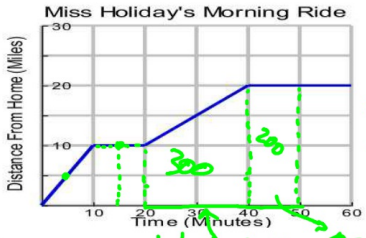
14. Find the vertical and horizontal asymptotes for the following function.

$f(x)=\dfrac{2x-5}{4x^2-25}$ $=\dfrac{2x-5}{(2x-5)(2x+5)}$ V.A. $2x+5=0$, $2x=-5$, $x=-2.5$ | HA $y=0$

$f(x)=\dfrac{1}{2x+5}$

The graph below depicts the typical early morning drive to school for infamous Calculus Teacher Ineeda Holiday.



$g=\dfrac{2x^2-7}{3x^2+2x}$

$y=\dfrac{2x^2}{3x^2}$

$y=2/3$

15. Find $\int_{20}^{50} f(t)\,dt$. $= 500$ $\frac{1}{2}(10+20)\,20$ $A(20)$

16. Find $f'(5)$. What is the "real world" meaning of this value?

find slope at $x=5$ $m=\frac{10}{10}=1 \Rightarrow f'(5)=1$

meaning: Her velocity at $t=5$ is 1 mile/minute.

17. Find $f'(15)$. What is the "real world" meaning of this value?

$f'(15)=0$ Her velocity at $t=15$ is 0 mph.

18. What is Miss Holiday's average velocity from t = 0 to t = 60?

Ave Velocity $=\dfrac{20-0}{60-0}=\dfrac{1}{3}$ miles/min.

19. Fill in the blanks to make a piece-wise defined function for our graph.

$$f(t)=\begin{cases} t, & t<10 \\ 10, & 10\le t<20 \\ \frac{1}{2}t, & 20\le t<40 \\ 20, & 40\le t\le 60 \end{cases}$$

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20. Sketch the graph, shade the area, and evaluate each definite integral.

$\int_{2}^{4}\left(\frac{1}{2}x-1\right)dx = \frac{1}{2}(2\cdot 1)$

$=1$