AP Calculus
2017-18 Last Min Review-2020 Edit   Name: ______________________

No Calc

1. $\lim_{x \to 0} \frac{e^{4x}-1}{\sin(2x)} =$ A) 0   B) 2   C) 4   D) Does not exist

2. For any positive integer k, $\lim_{x \to \infty} \frac{lnx}{x^k}$ A) 0   B) 1   C) k + 1   D) ∞

3. $\lim_{x \to \infty} \frac{cosx}{x^2+4x}$ A) -1   B) 0   C) 1   D) Does not exist

4. $\lim_{x \to 0} \frac{\cos(2\pi+h)-1}{\text{h}}$ A) -1   B) 0   C) 1   D) Does not exist

5. $\lim_{x \to 0} \frac{x^2e^x}{cosx-1}$ A) $-\infty$ B) -2   C) 0   D) 1

6. Consider the equation $(x – 1)^2 + (y + 1)^2 = 2$.

a) Find $\frac{dy}{dx}$

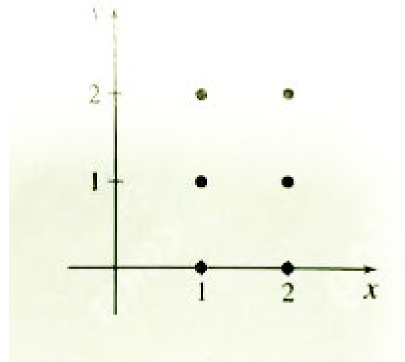
b) Write an equation for each horizontal tangent line to the graph.

c) The line y = x + b is normal to the graph of $(x – 1)^2 + (y + 1)^2 = 2$ at the point P. Find the value of b.

d) Write an equation of the tangent line to the graph of $(x – 1)^2 + (y + 1)^2 = 2$ at the point P.

7. Consider $\frac{dy}{dx} = \frac{2(y-1)^2}{\sqrt{x}}$

a) Sketch a slope field for the differential equation at the six points indicated.

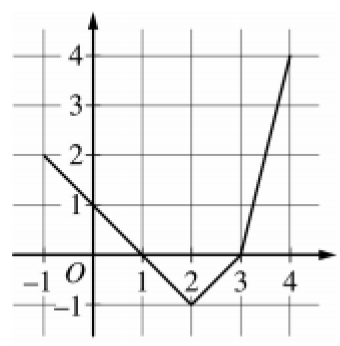


b) Let y = f(x) be the particular solution to the differential equation with the initial condition f(1) = 2. Write an equation for the line tangent to the graph of *f* at the point (1, 2).

c) Find the particular solution *y = f(x)* to the differential equation with initial condition *f(1) = 2*.

8. Let *f* be a continuous function defined on the closed interval -1 ≤ *x* ≤ 4. The graph of *f* is shown and consists of three line segments. Let *g* be the function defined by

$$g(x) = 5 + \int_2^x f(t)dt \; for -1 \le x \le 4$$



Graph of *f*

a) Find g(4)

b) On what intervals is g increasing? Justify your answer.

c) On the closed interval -1 ≤ *x* ≤ 4, find the absolute minimum value of g and find the absolute maximum value of g. Justify your answers.

d) Let $h(x) = x \cdot g(x). Find\ h'(2).$

t (minutes)	0	3	5	6	9
r(t) (rotations per minute)	72	95	112	77	50

9. Katie rode a stationary bike. The number of rotations per minute of the wheel of the stationary bike at time t minutes during Katie's ride is modeled by a differentiable function r for $0 \le t \le 9$ minutes. Values of $r(t)$ for selected values of t are shown in the table.

a) Estimate r'(4). Show the computations that lead to your answer. Indicate the units of measure.

b) Is there a time t, for $3 \le t \le 5$, at which $r(t)$ is 106 rotations per minute? Justify your answer.

c) Use left Riemannn Sum with four subintervals to approximate $\int_0^9 r(t)dt$. Using correct units, explain the meaning of $\int_0^9 r(t)dt$ in the context of the problem.

d) Bryce also rode a stationary bike. The number of rotations per minute of the wheel of the stationary bike at time t during Bryce's ride is modeled by the function s, defined by $s(t) = 40 + 20\pi sin\left(\frac{\pi t}{18}\right)$ for $0 \le t \le 9$ minutes. Find the average number of rotations per minute of the wheel of the stationary bike for $0 \le t \le 9$ minutes.