Precalc ACC '23 (Quattrin) Name:______________________

Practice Spring Final – Part I; 30 Minutes

Calculator Allowed score _____

1. Which of the following statements must be **false**?

(A) $\frac{d}{dx}\sqrt{e^x+3}=\frac{1}{2\sqrt{e^x+3}}$

(B) $\frac{d}{dx}(\ln\sin x)=\cot x$

(C) $\frac{d}{dx}\left(4x^4-e+\sqrt[7]{x^2}-\frac{2}{x^3}\right)=16x^3+\frac{2}{7\sqrt[7]{x^5}}+\frac{6}{x^4}$

(D) $\frac{d}{dx}\left[\ln\sqrt{4x+1}\right]=\frac{2}{4x+1}$

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2. If $y=x^2e^{2x}$, then $\frac{dy}{dx}=$

a) $2xe^{2x}$ b) $4xe^{2x}$ c) $xe^{2x}(x+1)$

d) $2xe^{2x}(x+1)$ e) $xe^{2x}(x+2)$

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3. The functions f(x) and g(x) are continuous and differentiable, and have values given in the table below.

x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
2	4	-2	8	1
4	10	8	4	3
8	6	-12	2	4

Given that $k(x) = \dfrac{f(x)}{g(x)}$, find $k'(4)$.

(A) $\frac{5}{2}$ (B) $\frac{8}{3}$ (C) $\frac{1}{2}$ (D) $\frac{1}{8}$ (E) $\frac{3}{5}$

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4. Find the equation of the line tangent to the curve $f(x) = 4x^4 - 5x^2 + x$ at the point where $x = -1$.

(A) $y + 2 = -5(x+1)$

(B) $y + 2 = -6(x+1)$

(C) $y - 5 = -2(x+1)$

(D) $y - 5 = -6(x+1)$

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5. Which of these functions has a point of exclusion at $(1,3)$ and a vertical asymptote at $x = \frac{1}{2}$?

(A) $g(x) = \dfrac{x-1}{4x^2-1}$

(B) $h(x) = \dfrac{x-1}{2x^2-3x+1}$

(C) $f(x) = \dfrac{2x+1}{4x^2-1}$

(D) $k(x) = \dfrac{3x-3}{2x^2-3x+1}$

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6. Find the end behavior, if any, for $g(x) = e^{2x}\sqrt{5-x}$.

a) Left end none; $y = 0$ on the right

b) Left end down; $y = 0$ on the right

c) Left end $y = 0$; right end up

d) Left end $y = 0$; right end none

e) None on the left and right

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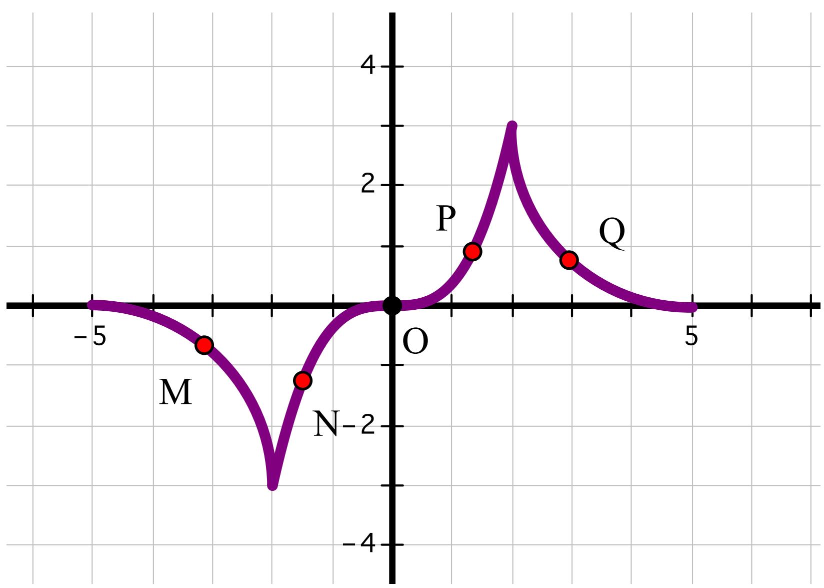
7. Suppose $f(x)$ has the derivative $f'(x) = -(x-3)^2(x+5)(x+1)$. Then

a) $f(x)$ has a relative minimum at $x = -5$ and $x = 3$
b) $f(x)$ has a relative maximum at $x = -5$ and a relative minimum at $x = -1$
c) $f(x)$ has a relative maximum at $x = -1$ and a relative minimum at $x = -5$ and $x = 3$
d) $f(x)$ has a relative maximum at $x = -1$ and a relative minimum at $x = -5$
e) $f(x)$ has a relative maximum at $x = -1$ and a relative minimum at $x = 3$



8. At what point on the above curve is $\dfrac{dy}{dx} > 0$ and $\dfrac{d^2y}{dx^2} < 0$

a) M b) N c) P d) Q

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9. A particle's velocity is given by $v(t) = \cos^2\left(\frac{\pi}{3}t\right)$. The particle's acceleration at $t = 1$ is:

(A) $\frac{-\pi\sqrt{3}}{6}$ (B) $\frac{-\sqrt{3}}{4}$ (C) $\frac{3}{4}$ (D) $\frac{\pi}{4}$ (E) DNE

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10. The domain of $y = \ln\left(x^3 - 9x\right)$ is

a) $x \in (-\infty, -3] \cup [0, 3]$

b) $x \in (-\infty, -3) \cup (0, 3)$

c) $x \in [-3, 0] \cup [3, \infty)$

d) $x \in (-3, 0) \cup (3, \infty)$

e) $x \in (-\infty, \infty)$

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11. Which of the following is true of $g(x) = \frac{1 + e^x}{e^x - 1}$?

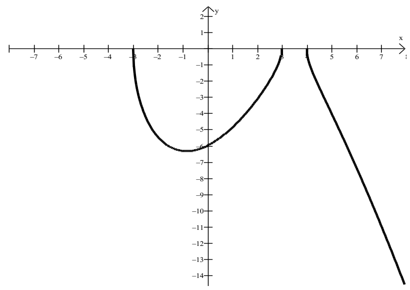
a) $g(x)$ has a y-intercept at $x = 0$

b) $g(x)$ attains a relative maximum at $x = 1$

c) $g(x)$ is increasing for $x \neq 0$

d) $g(x)$ has a zero at $x = 0$

e) $g(x)$ has a vertical asymptote at $x = 0$



12. Given the graph above, which of the following might be the sign pattern of $f(x)$?

a)

$f(x)$	+	0	−	0	+	0	−
x		−3		3		4	

b)

$f(x)$	−	0	+	0	−	0	+
x		−3		3		4	

c)

$f(x)$	+	0		0	+	0	
x		−3		3		4	

d)

$f(x)$	−	0		0	−	0	
x		−3		3		4	

e)

$f(x)$		0	−	0		0	−
x		−3		3		4	

Precalc ACC '23 (Quattrin) Name:______________________

Practice Spring Final – Part 60 Minutes

Dr. Quattrin

Calculator Allowed score _____

a. $\frac{d}{dx}\left(\tan 4x^2\right)$

b. $\frac{d}{dx}\left(\ln\left(x^2+7x\right)\right)$

c. $\frac{d}{dx}\left(e^{-\frac{1}{2}x}\csc x\right)$

d. $\frac{d}{dx}\left(\frac{\sin 5x}{25+x^2}\right)$

2. Find the end behavior of each of the following functions. Show the limits that lead to your conclusions.

a) $y = \left(4x^2 - 16x\right)e^{-0.25x}$

Left end:

Right End:

b) $y = \ln\left(-x^3 - 6x^2 + 5x + 30\right)$

Left end:

Right End:

c) $y = -\sqrt{\dfrac{16x}{x^2+4}}$.

Left end:

Right End:

3. Find the domain and Zeros of $y = -\sqrt{\dfrac{16x}{x^2+4}}$. Show the supporting derivative work.

Domain: ____________________

Zeros: _____________________________________

4. Find the extreme points of $y = -\sqrt{\dfrac{16x}{x^2+4}}$. Show the algebraic work to support the critical values.

Extreme Points: _____________________________________

5. Find the domain and Zeros of $y = \left(4x^2 - 16x\right)e^{-0.25x}$. Show the supporting derivative work.

Domain: ____________________

Zeros: _____________________________________

6. Find the extreme points of $y = \left(4x^2 - 16x\right)e^{-0.25x}$. Show the algebraic work to support the critical values.

Extreme Points: _____________________________________

7. Find the domain and Zeros of $y = \ln\left(-x^3 - 6x^2 + 5x + 30\right)$ on $x \in [-7, 5]$.

Domain: ____________________

Zeros: _____________________________________

8. Find the extreme points of $y = \ln\left(-x^3 - 6x^2 + 5x + 30\right)$ on $x \in [-7, 5]$.
Show the algebraic work to support the critical values.

Extreme Points: _____________________________________

Do **TWO** of the following three problems:

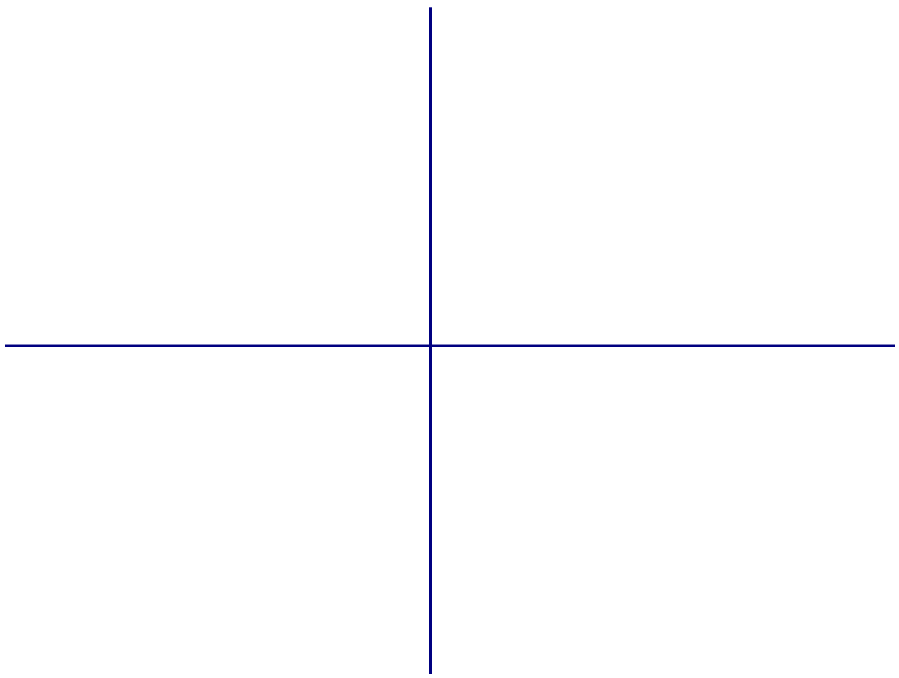
9. Find the traits and **sketch** of $y = \left(4x^2 - 16x\right)e^{-0.25x}$.

Domain: Range:

x – intercepts: y – intercept:

Extreme Points:

End Behavior (Left): End Behavior (Right):



10. Find the traits and sketch $y = \ln\left(-x^3 - 6x^2 + 5x + 30\right)$ on $x \in [-7, 5]$.

Domain:

Range:

x – intercepts:

y – intercept:

Extreme Points:

End Behavior (Left):

End Behavior (Right):

10. Find the traits and sketch $y = -\sqrt{\dfrac{16x}{x^2+4}}$.

Domain:

Range:

x – intercepts:

y – intercept:

Extreme Points:

End Behavior (Left):

End Behavior (Right):