Honors Precalc '16 (Quattrin) **Name:_____**
Spring Final – Part I
Calculator Allowed **score _____**
No Note Card Allowed

1. $\lim_{h\to 0}\dfrac{e^{(2+h)}-e^2}{h}==$

(a) 0 (b) 1 (c) $2e$ (d) e^2 (e) $2e^2$

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2. Let $g(x)=\begin{cases} e^{\frac{x}{10}+C}, & x<10 \\ 3, & x=10 \\ \log x+1, & x>10 \end{cases}$. Find the value of c for which $\lim_{x\to 10} g(x)$ exists.

(a) 3 (b) 2 (c) 1 (d) $\ln 2-1$ (e) no value

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3. If $f(x)=\sin^2(3-x)$, then $f'(0)=$

(a) $-2\cos 3$ (b) $-2\sin 3\cos 3$ (c) $6\cos 3$

(d) $2\sin 3\cos 3$ (e) $6\sin 3\cos 3$

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4. Let $f(x)=(2x-1)^5(x+1)$. Which of the following is an equation for the line tangent to the graph of f at the point where $x=1$?

(a) $y=21x+2$ (b) $y=21x-19$ (c) $y=11x-9$

(d) $y=10x+1$ (e) $y=10x-8$

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5. All the functions below, except one, have the property that $f(x)$ is equal to its fourth derivative, $f^{IV}(x)$. Which one does not have this property?

(a) $f(x)=\sin x$ (b) $f(x)=\cos x$ (c) $f(x)=-5e^x$

(d) $f(x)=e^{2x}$ (e) $f(x)=e^{-x}$

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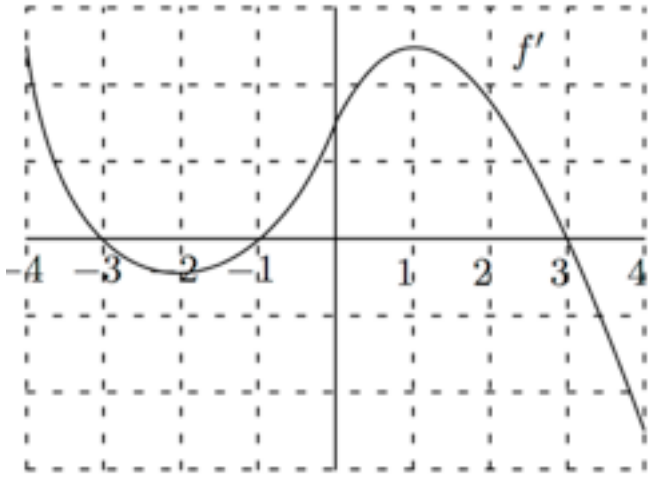
6. The graph of the derivative of a function f is shown below.



Which of the following are true about the original function f?

I. f is increasing on the interval $x \in (-2, 1)$.
II. f is continuous at $x = 0$.
III. f has an inflection point at $x = 2$

(a) I only (b) II only (c) I and II only

(d) II and III only (e) I, II and III

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7. The height of a conical sand pile is always twice the radius. If the sand is being added at a rate of $30\ \pi\ \text{cm}^3/\text{min}$, how fast is the height of the pile increasing when the circumference of the base of the sand pile is 120π? Note: $V_{cone} = \frac{\pi}{3} r^2 h$

(a) $\frac{1}{120\pi}\ \text{cm}/\text{min}$

(b) $\frac{1}{120}\ \text{cm}/\text{min}$

(c) $\frac{2}{15}\ \text{cm}/\text{min}$

(d) $\frac{2}{15\pi}\ \text{cm}/\text{min}$

(e) $\frac{1}{4}\ \text{cm}/\text{min}$

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8. Given $x^2y - 3x = y^3 - 3$, then at $(-1, 2)$, $\frac{dy}{dx} =$

(a) $-\frac{7}{11}$ (b) $-\frac{7}{13}$ (c) $-\frac{1}{2}$ (d) $-\frac{3}{14}$ (e) 7

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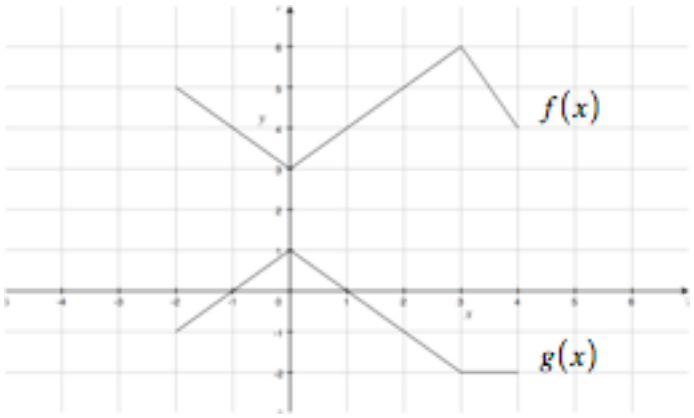
9. The graphs of $f(x)$ and $g(x)$ are shown below.

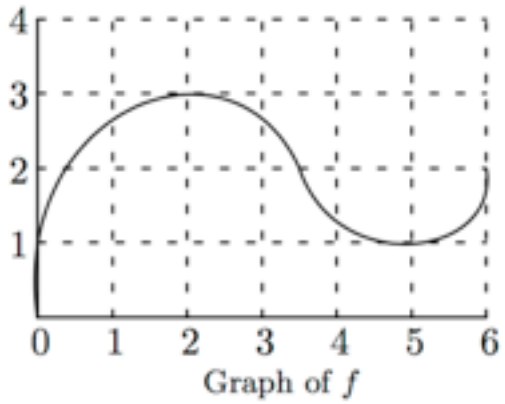


If $h(x)=\dfrac{g(2x)}{f(x)}$, then $h'(1)=$

(a) $-\dfrac{7}{4}$ (b) $-\dfrac{9}{16}$ (c) $-\dfrac{7}{16}$

(d) $-\dfrac{5}{16}$ (e) $-\dfrac{5}{16}$

10. The graph of the derivative of a function f is shown below.



Graph of f

Which of the following are true about the original function f?

I. $\lim_{h\to 0}\dfrac{f(2+h)-f(2)}{h}=f'(2)$.

II. $\dfrac{f(5)-f(2)}{5-2}=\dfrac{2}{3}$.

III. $f''(1)\le f''(5)$

(b) I and II only (b) I and III only (c) II and II only

(d) I, II and III (e) None of these

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11. Which of the following statements are true?

I. $\int \left(x^5 \sin x^6\right) dx = \frac{1}{6}\cos x^6 + c$ II. $\int \sec^2 x\, dx = \tan x + c$

III. $\int \frac{1}{\sqrt{x}}\, dx = \ln\sqrt{x} + c$

(a) I only (b) II only (c) III only

(d) I and II only (e) I and III only

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12. Which of the following statements must be true?

I. $\frac{d}{dx}\sqrt{e^x + 3} = \frac{e^x}{2\sqrt{e^x + 3}}$ II. $\frac{d}{dx}\left(\ln\cos x\right) = \tan x$

III. $\frac{d}{dx}\left(6x^3 - \pi + \sqrt[3]{x^8} - \frac{2}{x^3}\right) = 18x^2 + \frac{8}{3}\sqrt[3]{x^5} + \frac{6}{x^4}$

(a) I only (b) II only (c) III only

(d) I and III only (e) I, II, and III

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13. $\int_0^3 \left(6 + 6y - y^2\right) dy =$

(a) -18
(b) 45
(c) 54
(d) 36
(e) -12

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1. Find the domain and extreme points of $y=\frac{2x^2+3x-2}{2x^3+x^2-5x+2}$. Show the supporting derivative work.

Domain: _____

Extreme Points: _____

2. Find the domain, y-intercept, and extreme points of

$$f(x)=\begin{cases} e^{x-1}+4 & x>1 \\ \sqrt{2x^3+x^2-18x-9} & x\le 1 \end{cases}$$

. Show the supporting Calculus work.

Domain: _____ y-intercept: _____

Extreme Points: _____

3. Find the domain, zeros, extreme points, and POIs of $y = \ln\left(6 + x - x^2\right)$. Show the supporting work.

Domain: _____

Zeros: _____

Extreme Points: _____

POIs: _____

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4. Find the traits and sketch $f(x)=\begin{cases} e^{x-1}+4 & x>1 \\ \sqrt{2x^3+x^2-18x-9} & x\le 1 \end{cases}$.

Domain:

y - intercept:

Zeros:

POEs:

VAs:

Range:

EB (Left):

EB (Right):

Discontinuities:

Points of non-differentiability:

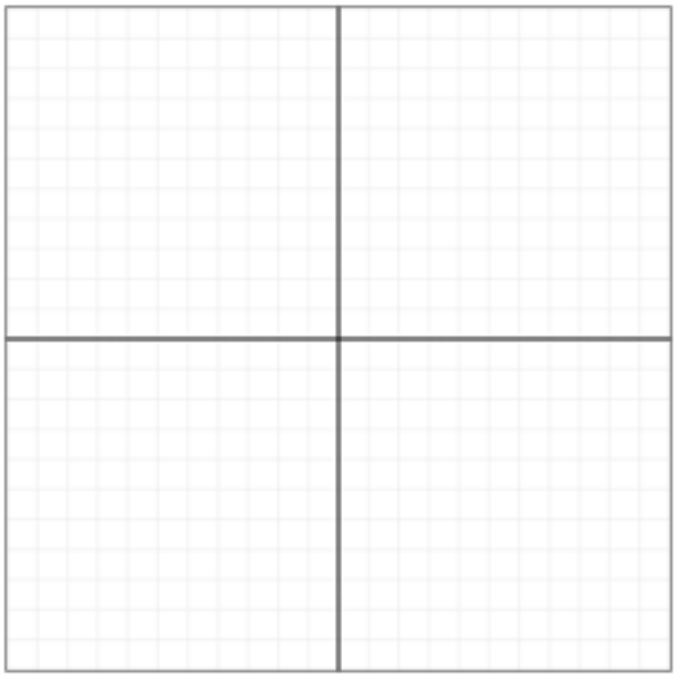
Extreme Points:

5. Show the sign patterns of f, f', and f'' for $y=\dfrac{2x^2+3x-2}{2x^3+x^2-5x+2}$ and use them to sketch the curve.

Sign Pattern for f:

Sign Pattern for f':

Sign Pattern for f'':



6. Show the sign patterns for the first and second derivative, list all traits of $y = \ln\left(6 + x - x^2\right)$, and use them to sketch the curve.

Domain:

Range:

Zeros:

y - intercept:

VAs:

POEs:

End Behavior (Left):

End Behavior (Left):

Extreme Points:

Sign Pattern for f' :

Sign Pattern for f'' :