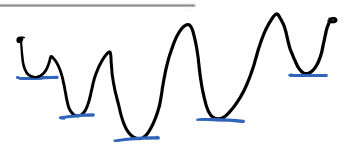
Week 11

Monday, May 1, 2023 5:51 PM

151WIRH11

MATH 151- WEEK-IN-REVIEW 12

ALEXANDRA L. FORAN



FINAL EXAM REVIEW

1. For a continuous function f, if $f'(3) = 0$ and $f''(3) = 7$, which of these statements do we know to be true about the graph of f at $x = 3$?

   (a) There is a local maximum at $x = 3$.

   (b) There is an absolute maximum at $x = 3$.

   (c) There is a local minimum at $x = 3$.

   (d) There is an absolute minimum at $x = 3$.

   (e) There is not enough information to determine the behavior of the graph at $x = 3$.

$24x^{-2}$

2. Find the x-values where local maximums or local minimums occur for $y = \frac{24}{x^2} + 12x + b$.

   (a) local min at $x = \sqrt[3]{4}$ only

   (b) local max at $x = 0$, local min at $x = \sqrt[3]{4}$

   (c) local min at $x = 0$, local max at $x = \sqrt[3]{4}$

   (d) local max at $x = \sqrt[3]{4}$ only

   (e) local max at $x = 0$ only

$\boxed{y' = -\frac{48}{x^3} + 12}$

0 is not in the domain $\Rightarrow$ Not a CV

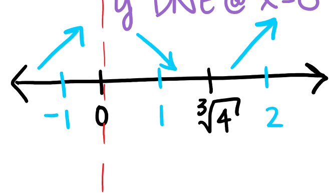
$0 = -\frac{48}{x^3} + 12$

$\frac{48}{x^3} = 12$

$x^3 = 4$

$x = \sqrt[3]{4}$

y' DNE @ x=0



3. The function $f(x)$ is defined at all real numbers except 8 and $f'(x) = \frac{-7(x-1)(x+4)}{(x-8)^4}$. At what x-value does $f(x)$ have a local minimum?

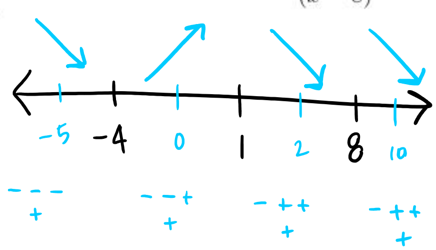
   (a) $x = 8$ only

   (b) $x = 1$ only

   (c) $x = -4$ only

   (d) $x = 1$ and $x = 8$ only

   (e) $f(x)$ does not have a local maximum.



4. Evaluate $\lim_{x\to 0^-} \dfrac{e^{4x} - 5 + 4(x+1)}{x^2}$.

$4x+4$

$\dfrac{1-5+4}{0} = \dfrac{0}{0}$

$\overset{L'H}{=} \lim_{x\to 0^-} \dfrac{4e^{4x}+4}{2x} = \dfrac{8}{0} = \dfrac{8}{\text{tiny negative}}$

(a) 0
(b) 8
(c) ∞
(d) 2
(e) $-\infty$

5. Approximate the area under the curve $f(x) = x^2 - 1$ on the interval $[2, 8]$ using three rectangles of equal width and midpoints.

(a) 106
(b) 226
(c) 80
(d) 304
(e) 160

widths

$\Delta x = \dfrac{b-a}{n} = \dfrac{8-2}{3} = 2$

Endpoints

2 3 4 5 6 7 8

heights

$f(3) = 8$

$f(5) = 24$

$f(7) = 48$

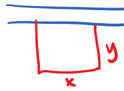
$f\left(\dfrac{a+\Delta x_i}{2}\right)$

$A = \lim_{n\to\infty} \sum_{i=1}^{n} \Delta x \cdot f(x_i)$

$A \approx 2(8+24+48) = 160$

6. Rancher Wyatt wants to fence a new pasture using a straight river as one side of the boundary. If Rancher Wyatt has 1200 yards of fencing materials, what are the DIMENSIONS of the largest area of the pasture that Rancher Wyatt can enclose?

(a) 300 yards x 300 yards
(b) 300 yards x 600 yards
~~(c)~~ 250 yards x 700 yards
~~(d)~~ 90,000 square yards
~~(e)~~ 180,000 square yards



OPTIMIZATION

$A = x \cdot y$

$A = (1200 - 2y) \cdot y$

$A = 1200y - 2y^2$

$A' = 1200 - 4y$

$0 = 1200 - 4y$

$y = 300$

CONSTRAINT

$1200 = 2y + x$

$x = 1200 - 2y$

$x = 1200 - 2(300)$

$= 600$

7. A particle has an acceleration given by $a(t) = 12t$ on the interval $[0, 10]$. If this particle has an initial velocity of 12 meters per second and has a position of 15 meters at $t = 1$, find the position at $t = 5$.

(a) 339 meters
(b) 315 meters
(c) 325 meters
(d) 311 meters
(e) 301 meters

$a(t) = 12t$

$v(t) = 6t^2 + C \rightarrow v(0) = C = 12$

$v(t) = 6t^2 + 12$

$s(t) = 2t^3 + 12t + D \rightarrow s(1) = 2 + 12 + D = 15$

$D = 1$

$s(t) = 2t^3 + 12t + 1$

$s(5) = 250 + 60 + 1$

8. Let f be a differentiable function such that $f(3) = 1$ and $f'(3) = -3$. If $h(x) = \dfrac{2f(x)}{x^2+1}$, find $h'(3)$.

(a) $-\dfrac{72}{100}$
(b) $-\dfrac{48}{100}$
(c) $\dfrac{72}{100}$
(d) $-\dfrac{72}{10}$
(e) $\dfrac{48}{10}$

$$h'(x) = \frac{(x^2+1)\cdot 2f'(x) - 2f(x)\cdot(2x)}{(x^2+1)^2}$$

$$h'(3) = \frac{10\cdot 2\cdot(-3) - 2(1)\cdot 6}{10^2} = \frac{-72}{100}$$

$4 \overline{)4003}$ = 1000 R3

9. Find the 4003rd derivative of $g(x) = 2\sin(5x)$.

(a) $\cancel{}$ $2 \cdot 5^{4003}\cos(5x)$
(b) $-2 \cdot 5^{4003}\sin(5x)$
(c) $\cancel{}$ $2 \cdot 5^{4003}\sin(5x)$
(d) $\cancel{}$ $2^{4003} \cdot 5^{4003}\sin(5x)$
(e) $-2 \cdot 5^{4003}\cos(5x)$

$\rightarrow g'(x) = 2\cdot 5\cdot\cos(5x)$

$\rightarrow g''(x) = -2\cdot 5^2\sin(5x)$

$\rightarrow g'''(x) = -2\cdot 5^3\cos(5x)$

$g^{iv}(x) = 2\cdot 5^4\sin(5x)$

10. Sand is being dropped at a rate of 10 ft^3/min onto a cone-shaped pile. If the height of the pile is always twice the base radius, at what rate is the height increasing when the pile is 8 ft high? Recall the volume formula for a cone is $V = \frac{\pi}{3}r^2h$.

(a) $\frac{5}{64\pi}$ ft/min

(b) $\frac{5}{8\pi}$ ft/min

(c) $\frac{5}{32\pi}$ ft/min

(d) $\frac{10}{9\pi}$ ft/min

(e) $\frac{10}{27\pi}$ ft/min

$V = \frac{1}{3}\pi\left(\frac{1}{2}h\right)^2 \cdot h$

$= \frac{1}{3}\pi \frac{1}{4}h^2 \cdot h$

$V = \frac{1}{12}\pi h^3$

$\frac{dV}{dt} = \frac{1}{4}\pi h^2 \frac{dh}{dt}$

$10 = 16\pi \frac{dh}{dt}$

$\frac{10}{16\pi} = \frac{dh}{dt}$

$V = \frac{1}{3}\pi r^2 h$

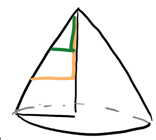
$V = \frac{1}{3}\pi r^2 \cdot (2r)$

$V = \frac{2}{3}\pi r^3$

$\frac{dV}{dt} = 2\pi r^2 \frac{dr}{dt}$

$10 = 2\pi(4)^2 \cdot \frac{dr}{dt}$

$\frac{10}{32\pi} = \frac{dr}{dt} \Rightarrow \frac{dh}{dt} = \frac{20}{32\pi}$



$h = 2r \rightarrow \boxed{\frac{dh}{dt} = 2\frac{dr}{dt}}$

$\frac{1}{2}h = r$

$\frac{1}{2}\frac{dh}{dt} = \frac{dr}{dt}$

11. Find the value c that satisfies the conclusion of the Mean Value Theorem for the function $f(x) = -3x^2 + 5x + 5$ on the interval $[0, 3]$.

(a) $\frac{17}{6}$

(b) 3

(c) $\frac{3}{2}$

(d) 0

(e) $\frac{17}{18}$

If [Continuous on $[0,3]$
differentiable on $(0,3)$

Then $\rightarrow \frac{f(b)-f(a)}{b-a} = f'(c)$

$\frac{f(3)-f(0)}{3-0} = \frac{-7-5}{3} = -4$

$f' = -6x+5$

$-6x+5 = -4$

$-6x = -9$

$x = 3/2$

12. Use logarithmic differentiation to find the derivative of $f(x) = \frac{(x^3+2x)^{400}}{(1+x)^{300}}$.

(a) $f'(x) = \left[\frac{400(3x^2+2)}{x^3+2x} - \frac{300}{1+x}\right] \cdot \frac{(x^3+2x)^{400}}{(1+x)^{300}}$

(b) $f'(x) = \left[\frac{400}{x^3+2x} - \frac{300}{1+x}\right] \cdot \frac{(x^3+2x)^{400}}{(1+x)^{300}}$

(c) $f'(x) = \frac{400(3x^2+2)}{x^3+2x} - \frac{300}{1+x}$

(d) $f'(x) = \frac{400(3x^2+2)(x^3+2x)^{398}}{(1+x)^{300}} - \frac{300(x^3+2x)^{400}}{(1+x)^{301}}$

(e) $f'(x) = \frac{100(x^3+2x)^{398}(9x^3+12x^2+2x+8)}{(1+x)^{301}}$

$\ln(f(x)) = \ln\left(\frac{(x^3+2x)^{400}}{(1+x)^{300}}\right)$

$= 400\ln(x^3+2x) - 300\ln(1+x)$

$\frac{1}{f(x)} \cdot f'(x) = 400 \cdot \frac{3x^2+2}{x^3+2x} - 300 \cdot \frac{1}{1+x}$

$f'(x) = (\qquad) \cdot f(x)$

13. Find the t-values where the tangent line to the following parametrically defined curve is horizontal or vertical.

$$x = 2t^3 - t^2 + 6 \qquad \text{and} \qquad y = -t^3 + \frac{9}{2}t^2 - 6t$$

$x' = 6t^2 - 2t$ $\qquad$ $y' = -3t^2 + 9t - 6$

$\frac{y'}{x'} = \frac{-3t^2+9t-6}{6t^2-2t}$

(a) horizontal tangents occur at $t = 1, 2$; vertical tangents occur at $t = 0, \frac{1}{3}$

~~(b)~~ horizontal tangents occur at $t = 0, \frac{1}{3}$; vertical tangents occur at $t = 1, 2$

~~(c)~~ horizontal tangents occur at $t = \frac{2}{3}, 1$; vertical tangents occur at $t = 0$

~~(d)~~ horizontal tangents occur at $t = 0$; vertical tangents occur at $t = \frac{2}{3}, 1$

~~(e)~~ horizontal tangents occur at $t = 1$; there are no vertical tangents

Horizontal:
$-3t^2+9t-6=0$
$t^2-3t+2=0$
$(t-2)(t-1)=0$
$t=2,\ t=1$

Vertical:
$2t(3t-1)=0$
$t=0,\ \frac{1}{3}$

14. Which of the following is a vector of unit length tangent to $\underbrace{\langle \sqrt{10t+5},\ e^{4t-8}\rangle}_{\vec{r}(t)}$ at $t = 2$?

③ divide by magnitude $\qquad$ ① take a derivative $\qquad$ ② plug in 2

(a) $\left\langle \frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}} \right\rangle$

(b) $\left\langle \frac{3}{5}, \frac{4}{5} \right\rangle$

(c) $\left\langle \frac{1}{\sqrt{5}}, \frac{4}{\sqrt{5}} \right\rangle$

(d) $\langle 1, 1\rangle$

(e) $\left\langle 1, \frac{4}{3} \right\rangle$

$\vec{r}'(t) = \left\langle \frac{1}{2}(10t+5)^{-1/2}\cdot 10,\ 4e^{4t-8} \right\rangle$

$r'(2) = \left\langle \frac{1}{2}(25)^{-1/2}\cdot 10,\ 4e^0 \right\rangle = \langle 1, 4\rangle$

$\sqrt{1^2+4^2} = \sqrt{17}$

$\frac{\vec{r}'(2)}{\|\vec{r}'(2)\|} = \boxed{\frac{\langle 1,4\rangle}{\sqrt{17}}}$

15. Find the values of the constants a and b that make the following piecewise function differentiable everywhere:

$$f(x) = \begin{cases} ax^3 + 16x & \text{if } x < 1 \\ 5x^2 + b & \text{if } x \geq 1 \end{cases}$$

$f'(x) = \begin{cases} 3ax^2+16 & \text{if } x<1 \\ 10x & \text{if } x\geq 1 \end{cases}$

$\lim_{x\to 1^+} f'(x) = 10$

$\lim_{x\to 1^-} f'(x) = 3a+16$

$3a+16=10$
$3a=-6$
$a=-2$

f(x) continuous
$\lim_{x\to 1^+} f(x) = 5+b$
$\lim_{x\to 1^-} f(x) = a+16$
$5+b=a+16$
$5+b=14$
$b=9$

(a) $a = 16,\ b = 5$

(b) $a = -2,\ b = 9$

(c) $a = -\frac{5}{3},\ b = \frac{28}{3}$

(d) $a = 1,\ b = 0$

(e) there is not enough information to determine a and b

16. Suppose $\int_5^9 g(x)\,dx = 4$. Evaluate $\int_5^9 (3 - 4g(x))\,dx$

(a) 39

(b) −13

(c) 19

(d) −4

(e) −36

$= \int_5^9 3\,dx - 4\int_5^9 g(x)\,dx$

$= \int_5^9 3\,dx - 4\cdot 4$

$= 3x\Big|_5^9 - 16$

$= 12 - 16$

17. Let $f(x) = \int_{\tan x}^{x} \frac{1}{\sqrt{4+t^3}}\,dt$. Find $f'(x)$

$f'(x) = \frac{1}{\sqrt{4+x^3}} - \frac{1}{\sqrt{4+\tan^3 x}}\cdot \sec^2 x$

~~(a)~~ $f'(x) = -\frac{\tan(x)}{\sqrt{4+\tan^3(x)}} + \frac{1}{\sqrt{4+x^3}}$

(b) $f'(x) = \frac{\sec^2(x)}{\sqrt{4+\tan^3(x)}} + \frac{1}{\sqrt{4+x^3}}$

(c) $f'(x) = -\frac{\sec^2(x)}{\sqrt{4+\tan^3(x)}} + \frac{1}{\sqrt{4+x^3}}$

~~(d)~~ $f'(x) = \frac{\tan(x)}{\sqrt{4+\tan^3(x)}} + \frac{1}{\sqrt{4+x^3}}$

~~(e)~~ $f'(x)$ does not exist

18. Evaluate $\int_1^2 \left(\frac{9}{x^5} - \frac{2}{x}\right) dx$

$9x^{-5} \rightarrow \frac{9x^{-4}}{-4}$

(a) $\frac{135}{64} - 2\ln(2)$

(b) $-\frac{135}{64} - \ln(2)$

(c) $\frac{135}{64} + 2\ln(2)$

(d) $-\frac{135}{64} - 2\ln(2)$

(e) $\frac{135}{64} + \ln(2)$

$\left(\frac{-9}{4x^4} - 2\ln|x|\right)\Big|_1^2$

$= \frac{-9}{64} - 2\ln(2) - \left(-\frac{9}{4} - \cancel{2\ln(1)}\right)$

$= -\frac{9}{64} + \frac{144}{64} - 2\ln(2)$

$= \frac{135}{64} - 2\ln(2)$

$16 \times 9 = 144$

19. Evaluate $\int \left(3x^2 - 10 + \frac{3}{x^2+1}\right) dx$.

~~(a)~~ $\frac{x^3}{3} - 10x + 3\arctan(x) + C$

~~(b)~~ $\frac{x^3}{3} - 10x + 3\arcsin(x) + C$

(c) $x^3 - 10x + 3\arctan(x) + C$

(d) $x^3 - 10x + 3\arcsin(x) + C$

~~(e)~~ $\frac{x^3}{3} - 10x + 3\tan(x) + C$

$\left|\int_0^{7/3}\right| + \left|\int_{7/3}^{4}\right|$ neg/pos neg/pos

NOT distance

20. The velocity function, in meters per second, is $v(t) = 3t - 7$. What is the displacement of the particle in the first four seconds it moves?

(a) 4 m

(b) −32 m

(c) 32 m

(d) 12 m

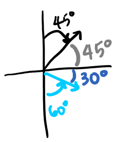
(e) −4 m

displacement $= \int_0^4 v(t)\, dt$

$= \int_0^4 (3t-7)\, dt = \left(\frac{3t^2}{2} - 7t\right)\Big|_0^4$

$= 24 - 28 - 0$

21. A plane is flying at 850 mph at N45°E. The wind is blowing at 30mph S60°E. Find the true direction of the plane.



(a) $\theta = \arctan\left(\frac{425\sqrt{2}+15\sqrt{3}}{425\sqrt{2}-15}\right)$

(b) $\theta = \arctan\left(\frac{425\sqrt{2}+15\sqrt{3}}{425\sqrt{2}+15}\right)$

(c) $\theta = \arctan\left(\frac{15-425\sqrt{2}}{15\sqrt{3}+425\sqrt{2}}\right)$

(d) $\theta = \arctan\left(\frac{425\sqrt{2}-15}{425\sqrt{2}+15\sqrt{3}}\right)$

(e) $\theta = \arctan\left(\frac{15\sqrt{3}+425\sqrt{2}}{15-425\sqrt{2}}\right)$

$\vec{p} = \langle 850\cos(45°), 850\sin(45°)\rangle$
$= \langle 425\sqrt{2}, 425\sqrt{2}\rangle$

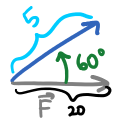
$\vec{w} = \langle 30\cos(30°), -30\sin(30°)\rangle$
$= \langle 15\sqrt{3}, -15\rangle$

$\vec{t} = \langle 425\sqrt{2} + 15\sqrt{3}, 425\sqrt{2} - 15\rangle$

$\theta = \arctan\left(\frac{y}{x}\right) = \arctan\left(\frac{425\sqrt{2}-15}{425\sqrt{2}+15\sqrt{3}}\right)$

22. A horizontal force of 20 pounds is acting on a box as it is pushed up a ramp that is 5 feet long and inclined at an angle of 60° above the horizontal. Find the work done on the box.

(a) 50 ft-lb
(b) $50\sqrt{3}$ ft-lb
(c) $50\sqrt{2}$ ft-lb
(d) 100 ft-lb
(e) 10 ft-lb



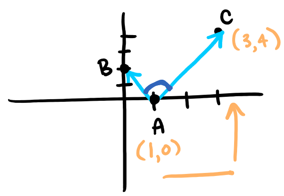
$\vec{F}\cdot\vec{D}$

$$\text{Work} = \|F\|\cdot\|D\|\cdot\cos\theta$$
$$= 20\cdot 5\cos(60°)$$
$$= 50 \text{ ft-lb}$$

$$\vec{F}\cdot\vec{D} = \|F\|\|D\|\cos\theta$$

23. Given the points $A(1,0)$, $B(0,2)$ and $C(3,4)$, find the angle, θ, located at the vertex A. That is, $\angle BAC$.

(a) $\theta = \arccos\left(\frac{3}{5}\right)$
(b) $\theta = \arccos\left(-\frac{1}{\sqrt{65}}\right)$
(c) $\theta = 180°$
(d) $\theta = \arccos\left(\frac{1}{\sqrt{65}}\right)$
(e) $\theta = \arccos\left(\frac{3}{\sqrt{17}}\right)$



$$\vec{AB} = \langle -1, 2\rangle$$
$$\vec{AC} = \langle 2, 4\rangle$$

$$\cos\theta = \frac{-2+8}{\sqrt{5}\sqrt{20}} = \frac{6}{10}$$
$$\theta = \arccos\left(\frac{3}{5}\right)$$

24. Find the slope of the tangent line to the graph $x^2y^2 - 3y = 0$ at the point $(1, -3)$.

(a) $-\frac{5}{2}$
(b) $\frac{5}{2}$
(c) -8
(d) 2
(e) -2

$$x^2\cdot 2y\cdot y' + y^2\cdot 2x - 3y' = 0$$
$$y'(2x^2y - 3) = -2xy^2$$
$$y' = \frac{-2xy^2}{2x^2y-3}$$
$$y' = \frac{-18}{-6-3} = \frac{-18}{-9} = 2$$

25. Which of the following graphs would match the parametric equations?

$x = 3t^2$ and $y = 2 - 5t$

$x' = 6t$

t	x	y
$\boxed{0}$	0	2
1	3	-3
2		

$y - 2 = -5t$

$\frac{y-2}{-5} = \frac{-5t}{-5}$

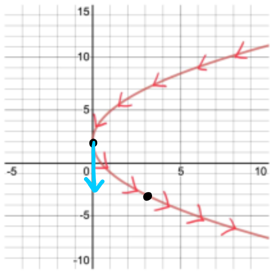
$t = \frac{y-2}{-5}$

$x = 3\left(\frac{y-2}{-5}\right)^2$

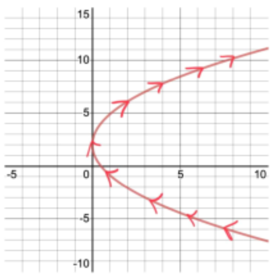
$x' = 6t \qquad y' = -5$

$\langle 0, -5 \rangle$

(a)



(b)



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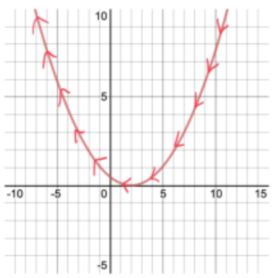
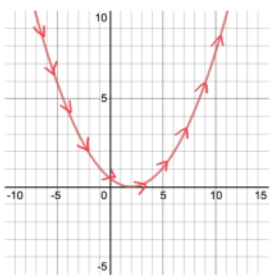
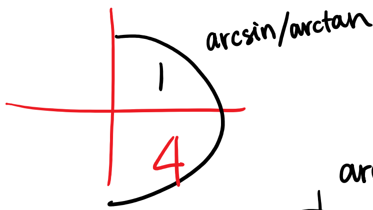


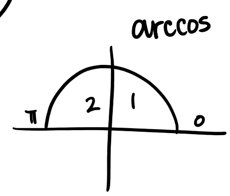
(d)



(e) None of the listed answers.

26. What is $\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$?





(a) $\frac{5\pi}{6}$

(b) $-\frac{\pi}{6}$

→ (c) $-\frac{\pi}{3}$

(d) $\frac{2\pi}{3}$

(e) $-\frac{5\pi}{6}$

27. Calculate $\lim_{x\to 3^+} \frac{x^2-2x-7}{x^2-5x+6}$. $= \lim_{x\to 3^+} \frac{-4}{(x-3)(x-2)} = \frac{-4}{\text{tiny pos. \#}}$

(a) $-\infty$

(b) ∞

~~(c)~~ 1

~~(d)~~ -4

~~(e)~~ $-\frac{7}{6}$

28. Use linear approximation to estimate $\sqrt[3]{27.2}$

$a = 27 \quad f(x) = \sqrt[3]{x}$

$f(27) = 3$

$f'(x) = \frac{1}{3}x^{-2/3} = \frac{1}{3(\sqrt[3]{27})^2} = \frac{1}{27}$

$L(x) = f(a) + f'(a)(x-a)$

$y - y_1 = m(x - x_1)$

$y - 3 = \frac{1}{27}(x - 27) \leftarrow y = \frac{1}{27}(27.2 - 27) + 3$

$y = \frac{1}{27}x - 1 + 3 \qquad = \frac{1}{27}\left(\frac{1}{5}\right) + 3$

$\underline{y = \frac{1}{27}x + 2} \qquad = \frac{1}{135} + 3$

$= \frac{1 + 405}{135}$

(a) $\frac{801}{270}$

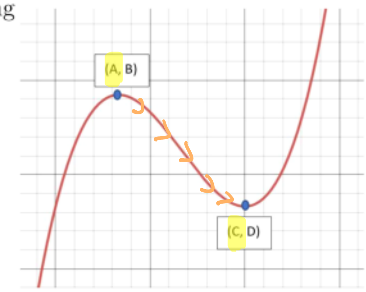
(b) $\frac{1}{135}$

(c) $\frac{406}{135}$

(d) $\frac{402}{135}$

(e) $\frac{803}{270}$

29. Given the graph of $f(x)$, on which of the following interval(s) is $g'(x)$ negative if $g(x) = 3f(x)$?



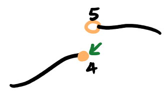
(a) $(-\infty, A), (C, \infty)$

(b) $(-\infty, B), (D, \infty)$

(c) (A, C)

(d) (B, D) only

(e) none of these



30. Given $f(x) = \begin{cases} x+2 & \text{if } x < 2 \\ x^2 & \text{if } x = 2 \\ 5 & \text{if } x > 2 \end{cases}$. Which of the following statements is true?

$\lim_{x\to 2^-} = 4$

$\lim_{x\to 2^+} = 5$

(a) $f(x)$ is continuous from the left at $x = 2$.

(b) $f(x)$ is continuous from the right at $x = 2$.

~~(c)~~ $f(x)$ is continuous at $x = 2$.

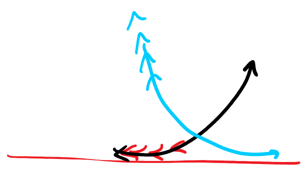
(d) None of these is true.

~~(e)~~ $f(x)$ is not continuous at $x = 2$ because $\lim_{x\to 2} f(x)$ exists but does not equal $f(2)$.

No jump

31. Compute $\lim_{x\to-\infty} \frac{5e^{2x} - 8e^{-3x}}{3e^{2x} + 2e^{-3x}} = \frac{-8}{2}$

0



(a) 0

(b) $\frac{5}{3}$

(c) -4

(d) $-\infty$

(e) ∞

32. Calculate $\lim_{x\to\infty}[\ln(1+2x)-\ln(2+x)]$.

(a) 0

(b) 1

(c) ln(2)

(d) ∞

(e) $-\infty$

$= \lim_{x\to\infty} \ln\left(\frac{1+2x}{2+x}\right) = \ln(2)$

$\overset{L'H}{=} \lim \ln\left(\frac{2}{1}\right)$

33. The domain of $f(x)$ is all real numbers and $f''(x) = 3x(x^2-16)(x-4)$. Give the x-coordinate of the inflection point(s).

$(x+4)(x-4)$

$= 3x(x+4)(x-4)^2$

(a) $x=0, x=4,$ and $x=-4$

(b) $x=0$ and $x=-4$ only

(c) $x=4$ and $x=-4$ only

(d) $x=0$ and $x=4$ only

(e) $f(x)$ has no inflection points.

-5 -4 -1 0 1 4 5

- - +   - + +   + + +   + + +

34. An object is moving according to the equation of motion $s(t) = \cos t + \frac{1}{4}t^2$. Find the time(s) when the acceleration is zero for $0 \le t \le 2\pi$.

(a) $t = \frac{\pi}{3}, \frac{2\pi}{3}$

~~(b)~~ $t = \frac{\pi}{6}, \frac{5\pi}{6}$

~~(c)~~ $t = \frac{4\pi}{3}, \frac{5\pi}{3}$

~~(d)~~ $t = \frac{7\pi}{6}, \frac{11\pi}{6}$

(e) $t = \frac{\pi}{3}, \frac{5\pi}{3}$

$V(t) = -\sin(t) + \frac{1}{2}t$

$a(t) = -\cos(t) + \frac{1}{2}$

$0 = -\cos(t) + \frac{1}{2}$

$\cos(t) = \frac{1}{2}$

35. Find the derivative of the function $f(x) = \arcsin(e^{4x})$

(a) $f'(x) = \dfrac{4e^{4x}}{\sqrt{1-e^{8x}}}$

(b) $f'(x) = -\dfrac{4e^{4x}}{\sqrt{1-e^{8x}}}$

(c) $f'(x) = \dfrac{4e^{4x}}{1+e^{8x}}$

(d) $f'(x) = -\dfrac{4e^{4x}}{1+e^{8x}}$

(e) $f'(x) = \dfrac{4e^{4x}}{1-e^{8x}}$

$f'(x) = \dfrac{1}{\sqrt{1-(e^{4x})^2}} \cdot e^{4x} \cdot 4$