Key



**90 Minutes—No Calculator**

*Notes*: (1) In this examination, $\ln x$ denotes the natural logarithm of $x$ (that is, logarithm to the base $e$).

(2) Unless otherwise specified, the domain of a function $f$ is assumed to be the set of all real numbers $x$ for which $f(x)$ is a real number.

1. $\int_1^2 x^{-3}\,dx =$  $\left.\frac{x^{-2}}{-2}\right|_1^2 = \left.\frac{-1}{2x^2}\right|_1^2 = \frac{-1}{8} + \frac{+1}{2}\frac{4}{8} = \frac{3}{8}$

(A) $-\frac{7}{8}$ (B) $-\frac{3}{4}$ (C) $\frac{15}{64}$ (D) $\frac{3}{8}$ (E) $\frac{15}{16}$

---

2. If $f(x) = (2x+1)^4$, then the 4th derivative of $f(x)$ at $x = 0$ is

$f'(x) = 4(2x+1)^3 \cdot 2 = 8(2x+1)^3$

$f''(x) = 24(2x+1)^2 \cdot 2 = 48(2x+1)^2$

(A) 0 (B) 24 (C) 48 (D) 240 (E) 384

$f'''(x) = 96(2x+1)^1 \cdot 2 = 192(2x+1)$

$f^{iv}(x) = 192(2x+1)^0 \cdot 2 = 384$

---

3. If $y = \frac{3}{4+x^2}$, then $\frac{dy}{dx} =$  $y = 3(4+x^2)^{-1}$

$y' = -3(4+x^2)^{-2}\,(2x)$

don't use quotient rule - not needed!

(A) $\frac{-6x}{\left(4+x^2\right)^2}$ (B) $\frac{3x}{\left(4+x^2\right)^2}$ (C) $\frac{6x}{\left(4+x^2\right)^2}$ (D) $\frac{-3}{\left(4+x^2\right)^2}$ (E) $\frac{3}{2x}$

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4. If $\int \frac{dy}{dx} = \int \cos(2x)$, then $y = \frac{1}{2}\int \cos(2x)\,(2)\,dx = \frac{1}{2}\sin(2x) + C$

(A) $-\frac{1}{2}\cos(2x)+C$ (B) $-\frac{1}{2}\cos^2(2x)+C$ (C) $\frac{1}{2}\sin(2x)+C$

(D) $\frac{1}{2}\sin^2(2x)+C$ (E) $-\frac{1}{2}\sin(2x)+C$

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5. $\lim\limits_{n\to\infty} \frac{4n^2}{n^2+10{,}000n}$ is  same exp. ($\lim\limits_{x\to\infty}$ approaches coefficients $= \frac{4}{1} = 4$

( $\boxed{\text{OR}}$ $\div$ each term by $n^2$ & simplify)

(A) 0 (B) $\frac{1}{2{,}500}$ (C) 1 (D) 4 (E) nonexistent

6. If $f(x)=x$, then $f'(5)=$ $f'(x)=1$ (at all values)

(A) 0 (B) $\frac{1}{5}$ (C) 1 (D) 5 (E) $\frac{25}{2}$

7. Which of the following is equal to $\ln 4$?

(A) $\ln 3+\ln 1$ (B) $\frac{\ln 8}{\ln 2}$ (C) $\int_1^4 e^t\,dt$ (D) $\int_1^4 \ln x\,dx$ (E) $\int_1^4 \frac{1}{t}\,dt$

$\ln(3\cdot 1)$ $\ln 4 = \ln\frac{8}{2}$ something w/ e no ln other $\int$

$= \ln|t| \Big|_1^4$

$\ln 4 - \ln 1$

$= \ln 4$ ✓

8. The slope of the line tangent to the graph of $y=\ln\left(\frac{x}{2}\right)$ at $x=4$ is

$y' = \frac{1}{\frac{x}{2}} \cdot \frac{1}{2} = \frac{1}{2}\cdot\frac{2}{x} = \frac{1}{x}$ $\to \frac{1}{4}$

(A) $\frac{1}{8}$ (B) $\frac{1}{4}$ (C) $\frac{1}{2}$ (D) 1 (E) 4

9. If $\int_{-1}^{1} e^{-x^2}\,dx=k$, then $\int_{-1}^{0} e^{-x^2}\,dx=$

can do integration algebraically $\boxed{\text{OR}}$ realize $e^{-x^2}=y$ is symmetric to y axis, so $\Rightarrow \int_{-1}^{1} e^{-x^2}\,dx = 2\int_{-1}^{0} e^{-x^2}\,dx$

(A) $-2k$ (B) $-k$ (C) $-\frac{k}{2}$ (D) $\frac{k}{2}$ (E) $2k$

$k = 2\int_{-1}^{0} e^{-x^2}\,dx$

$\frac{k}{2} = \int$ ✓

10. If $y=10^{(x^2-1)}$, then $\frac{dy}{dx}=$ $10^{x^2-1}(\ln 10)(2x)$

(A) $(\ln 10)10^{(x^2-1)}$ (B) $(2x)10^{(x^2-1)}$ (C) $(x^2-1)10^{(x^2-2)}$

(D) $2x(\ln 10)10^{(x^2-1)}$ (E) $x^2(\ln 10)10^{(x^2-1)}$

11. The position of a particle moving along a straight line at any time $t$ is given by $s(t)=t^2+4t+4$. What is the acceleration of the particle when $t=4$?

$v(t) = 2t+4$

$a(t) = 2$

(A) 0 (B) 2 (C) 4 (D) 8 (E) 12

? pre calc

12. If $f(g(x))=\ln(x^2+4)$, $\boxed{f(x)=\ln(x^2)}$ and $g(x)>0$ for all real $x$, then $g(x)=$

(A) $\frac{1}{\sqrt{x^2+4}}$ (B) $\frac{1}{x^2+4}$ (C) $\sqrt{x^2+4}$ (D) $x^2+4$ (E) $x+2$

$f(g(x))$

$f(\sqrt{x^2+4})$





$\ln\left(\left[\sqrt{x^2+4}\right]^2\right)$

$= \ln(x^2+4)$ ✓

$2x + x\frac{dy}{dx} + y + 3y^2\frac{dy}{dx} = 0$

$\frac{dy}{dx}\left[x + 3y^2\right] = -y - 2x$

13. If $x^2 + xy + y^3 = 0$, then, in terms of $x$ and $y$, $\frac{dy}{dx} =$

(A) $-\frac{2x+y}{x+3y^2}$ (B) $-\frac{x+3y^2}{2x+y}$ (C) $\frac{-2x}{1+3y^2}$ (D) $\frac{-2x}{x+3y^2}$ (E) $-\frac{2x+y}{x+3y^2-1}$

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14. The velocity of a particle moving on a line at time $t$ is $v = 3t^{\frac{1}{2}} + 5t^{\frac{3}{2}}$ meters per second. How many meters did the particle travel from $t = 0$ to $t = 4$?

total dist., not displacement! $\Rightarrow \int |v(t)|$

but v is always pos. $\int_0^4 |v(t)| = \int_0^4 3t^{1/2} + 5t^{3/2}\,dt$

(A) 32 (B) 40 (C) 64 (D) 80 (E) 184

$= 2t^{3/2} + 2t^{5/2}\Big|_0^4$

$(2(4)^{3/2} + 2(4)^{5/2}) - (0+0)$

$2\cdot 8 + 2\cdot 32$

$16 + 64 = 80$

---

15. The domain of the function defined by $f(x) = \ln\left(x^2 - 4\right)$ is the set of all real numbers $x$ such that

$x^2 - 4 > 0$ $> 0$

$+ \; - \; +$

$-2 \quad 2$

$x < -2 \quad x > 2$

(A) $|x| < 2$ (B) $|x| \le 2$ (C) $|x| > 2$ (D) $|x| \ge 2$ (E) $x$ is a real number

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16. The function defined by $f(x) = x^3 - 3x^2$ for all real numbers $x$ has a relative maximum at $x =$

(A) $-2$ (B) 0 (C) 1 (D) 2 (E) 4

$f'(x) = 3x^2 - 6x$

$= 3x(x-2)$

$x = 0, 2$

$+ \; - \; +$

$0 \quad 2$

rel. max

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~~17.~~ $\int_0^1 xe^{-x}\,dx =$

int. by parts $\Rightarrow$ not in AB curriculum any more

(A) $1-2e$ (B) $-1$ (C) $1-2e^{-1}$ (D) 1 (E) $2e-1$

---

18. If $y = \cos^2 x - \sin^2 x$, then $y' =$

double < formula (= cos 2x)

$y = \cos(2x)$

$y' = -\sin(2x)\cdot 2$

(A) $-1$ (B) 0 (C) $-2\sin(2x)$ (D) $-2(\cos x + \sin x)$ (E) $2(\cos x - \sin x)$

---

? precalc.

19. If $f(x_1) + f(x_2) = f(x_1 + x_2)$ for all real numbers $x_1$ and $x_2$, which of the following could define $f$?

(~~A~~) $f(x) = x+1$ (B) $f(x) = 2x$ (C) $f(x) = \frac{1}{x}$ (D) $f(x) = e^x$ (E) $f(x) = x^2$

$f(x_1) + f(x_2)$

$x_1 + 1 + x_2 + 1$

$= x_1 + x_2 + 2$

$f(x_1) + f(x_2)$

$2x_1 + 2x_2$

yes




$f(x_1 + x_2)$

$x_1 + x_2 + 1$

no

$f(x_1 + x_2)$

$= 2(x_1 + x_2) = 2x_1 + 2x_2$

$\tan^{-1} = \frac{1}{1+u^2} \cdot u'$



20. If $y = \arctan(\cos x)$, then $\frac{dy}{dx} =$

$\frac{1}{1+\cos^2 x} \cdot -\sin x$

(A) $\frac{-\sin x}{1+\cos^2 x}$ (B) $-(\operatorname{arcsec}(\cos x))^2 \sin x$ (C) $(\operatorname{arcsec}(\cos x))^2$

(D) $\frac{1}{(\arccos x)^2 + 1}$ (E) $\frac{1}{1+\cos^2 x}$

---

? all in terms of y?

? precalc

21. If the domain of the function $f$ given by $f(x) = \frac{1}{1-x^2}$ is $\{x : |x| > 1\}$, what is the range of $f$?

$f(x) = \frac{1}{1-(\# \text{ bigger than } 1)}$

makes $x^2 > 1$

since $x$ is always pos.

$x^2 - 1 > 0$

(A) $\{x : -\infty < x < -1\}$ (B) $\{x : -\infty < x < 0\}$ (C) $\{x : -\infty < x < 1\}$

(D) $\{x : -1 < x < \infty\}$ (E) $\{x : 0 < x < \infty\}$

$x = 1, -1$

domain, not range

$= \frac{1}{-\#}$

so $f(x)$ is always negative $y < 0$

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22. $\int_1^2 \frac{x^2-1}{x+1}\,dx =$ $= \frac{\cancel{(x+1)}(x-1)}{\cancel{x+1}} = \int_1^2 x - 1\,dx$

$= \frac{x^2}{2} - x \Big|_1^2 = \left(\frac{4}{2} - 2\right) - \left(\frac{1}{2} - 1\right) = 0 + +\frac{1}{2}$

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

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23. $\frac{d}{dx}\left(\frac{1}{x^3} - \frac{1}{x} + x^2\right)$ at $x = -1$ is

$y = x^{-3} - x^{-1} + x^2$

$y' = -3x^{-4} + x^{-2} + 2x$ @ $x = -1 \Rightarrow -3\left(\frac{1}{(-1)^4}\right) + \frac{1}{(-1)^2} + 2(-1)$

(A) $-6$ (B) $-4$ (C) 0 (D) 2 (E) 6

$-3 + 1 - 2$

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24. If $\int_{-2}^{2} (x^7 + k)\,dx = 16$, then $k =$

$16 = \frac{x^8}{8} + kx \Big|_{-2}^{2}$

$16 = \left(\frac{2^8}{2^3} + 2K\right) - \left(\frac{(-2)^8}{2^3} + -2K\right)$

$16 = 2K + 2K$

(A) $-12$ (B) $-4$ (C) 0 (D) 4 (E) 12

$\frac{16}{4} = K$

$4 = K$

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25. If $f(x) = e^x$, which of the following is equal to $f'(e)$?

$\cancel{f'(x) = e^x}$ $e^e$

(A) $\lim_{h \to 0} \frac{e^{x+h}}{h}$ (B) $\lim_{h \to 0} \frac{e^{x+h} - e^e}{h}$ (C) $\lim_{h \to 0} \frac{e^{e+h} - e}{h}$

no

(D) $\lim_{h \to 0} \frac{e^{x+h} - 1}{h}$ (E) $\lim_{h \to 0} \frac{e^{e+h} - e^e}{h}$

$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \to 0} \frac{e^{x+h} - e^x}{h}$ at $x = e$ $= \lim_{h \to 0} \frac{e^{e+h} - e^e}{h}$

? precal

26. The graph of $y^2 = x^2 + 9$ is symmetric to which of the following?

$y^2 - x^2 = 9$

hyperbola

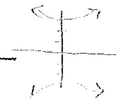
I. The $x$-axis $\quad -f(x) = f(x) \quad (-y)^2 = x^2+9 \quad y^2 = x^2+9$ ✓

II. The $y$-axis $\quad f(-x) = f(x) \quad y^2 = (-x)^2+9 \quad y^2 = x^2+9$ ✓

III. The origin $\quad -f(-x) = f(x) \quad (-y)^2 = (-x)^2+9 \quad y^2 = x^2+9$ ✓

$\frac{y^2}{9} - \frac{x^2}{9} = 1$

(y-int ± 3
no x-int)



(A) I only (B) II only (C) III only (D) I and II only (E) I, II, and III

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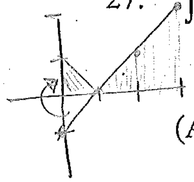
27. $\int_0^3 |x-1|\,dx = \quad -\int_0^1 x-1\,dx + \int_1^3 x-1\,dx \quad = \frac{1}{2}\cdot 1\cdot 1 + \frac{1}{2}\cdot 2\cdot 2$

$\frac{1}{2} + 2 = 2.5$

$\boxed{OR}$ do algebraically instead of geometrically



(A) 0 (B) $\frac{3}{2}$ (C) 2 (D) $\frac{5}{2}$ (E) 6

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28. If the position of a particle on the $x$-axis at time $t$ is $\boxed{x(t) = -5t^2}$, then the average velocity of the particle for $0 \le t \le 3$ is

= avg. rate of $x(t)$ = $\frac{x(3)-x(0)}{3-0}$

~~$v(t) = -10t$~~ won't be avg. velocity

(A) −45 (B) −30 (C) −15 (D) −10 (E) −5

$= \frac{-5(3)^2 + 5(0)}{3} = \frac{-5(9)}{3} = -15$

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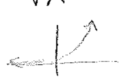
29. Which of the following functions are continuous for all real numbers $x$?

I. $y = x^{\frac{2}{3}}$ $\quad \sqrt[3]{x}^{\,2}$ ok even for zero, negatives, etc.

II. $y = e^x$



~~III.~~ $y = \tan x$

(A) None (B) I only (C) II only (D) I and II (E) I and III

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30. $\int \tan(2x)\,dx =$ Integrate quotient $\quad \int \tan x = \ln|\sec x| + C$

(A) $-2\ln|\cos(2x)| + C$ (B) $-\frac{1}{2}\ln|\cos(2x)| + C$ (C) $\frac{1}{2}\ln|\cos(2x)| + C$

(D) $2\ln|\cos(2x)| + C$ (E) $\frac{1}{2}\sec(2x)\tan(2x) + C$

$\int \frac{\sin 2x}{\cos 2x}\,dx = \left(-\frac{1}{2}\right)\int \frac{1}{\cos 2x}(-2)\sin 2x\,dx = -\frac{1}{2}\ln|\cos(2x)| + C$

31. The volume of a cone of radius $r$ and height $h$ is given by $V = \frac{1}{3}\pi r^2 h$. If the radius and the height both increase at a constant rate of $\frac{1}{2}$ centimeter per second, at what rate, in cubic centimeters per second, is the volume increasing when the height is 9 centimeters and the radius is 6 centimeters?

$\frac{dr}{dt} = .5$ cm/s

$\frac{dh}{dt} = .5$ cm/s

$\frac{dV}{dt} = ?$

(A) $\frac{1}{2}\pi$ (B) $10\pi$ (C) $24\pi$ (D) $54\pi$ (E) $108\pi$

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

$\frac{dV}{dt} = \frac{\pi}{3}\left(r^2 \frac{dh}{dt} + h 2r \frac{dr}{dt}\right)$

$\frac{dV}{dt} = \frac{\pi}{3}\left(36(.5) + 2(9)(6)(.5)\right)$

18 + 54

$\frac{72\pi}{3}$

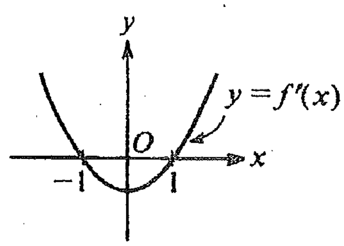
$24\pi$

32. $\frac{1}{3}\int_0^{\frac{\pi}{3}} \sin(3x)\,(3)\,dx =$ $-\frac{1}{3}\cos(3x)\Big|_0^{\pi/3} = -\frac{1}{3}\cos\pi + \frac{1}{3}\cos 0$

$\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$

note: if u sub used, change limits of integration!

(A) $-2$ (B) $-\frac{2}{3}$ (C) $0$ (D) $\frac{2}{3}$ (E) $2$




( f(x) ⇒ incr. decr. incr. )

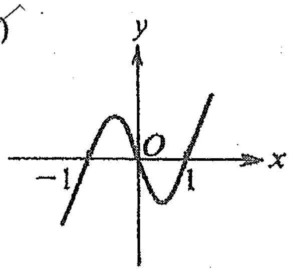
f '(x) + − +

−1 1

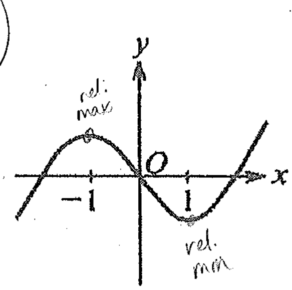
rel. max rel. min

33. The graph of the derivative of $f$ is shown in the figure above. Which of the following could be the graph of $f$?

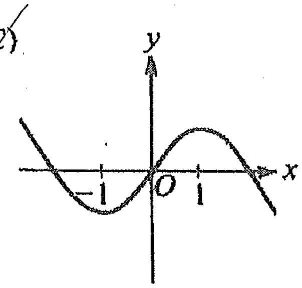
(A)



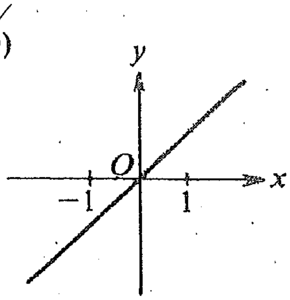

(B)



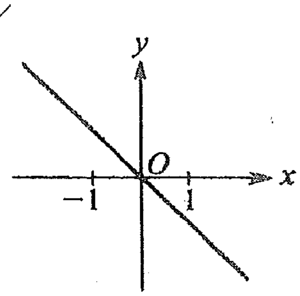

(C)




(D)




(E)



$x^3+8 = x+8$
$x^3 - x = 0$
$x(x^2-1) = 0$
$x(x+1)(x-1)$
$x = 0, -1, 1$



34. The area of the region in the first quadrant that is enclosed by the graphs of $y = x^3 + 8$ and $y = x + 8$ is

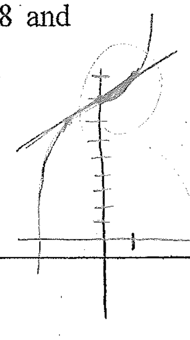
$\int$ top - bottom $\quad \int_0^1 (x+8) - (x^3+8)\, dx$

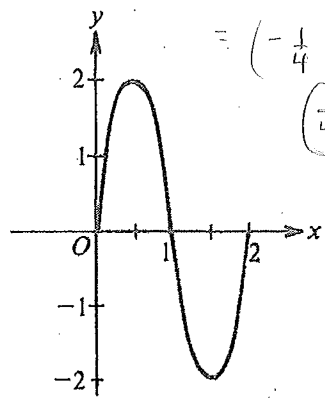
(A) $\frac{1}{4}$ (B) $\frac{1}{2}$ (C) $\frac{3}{4}$ (D) 1 (E) $\frac{65}{4}$

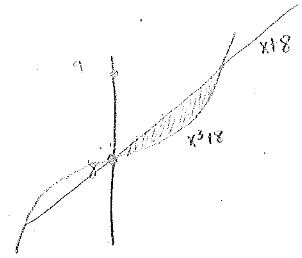
$= \int_0^1 -x^3 + x\, dx = \left. -\frac{x^4}{4} + \frac{x^2}{2} \right|_0^1$

$= \left(-\frac{1}{4} + \frac{1}{2}\right) - (0 + 0)$

$\frac{1}{4}$






pre-pre calc!

35. The figure above shows the graph of a sine function for one complete period. Which of the following is an equation for the graph?

$\to \frac{2\pi}{b} = \frac{2}{1}$ $\quad \frac{2b}{2} = \frac{2\pi}{2}$ $\quad b = \pi$

(A) $y = 2\sin\left(\frac{\pi}{2}x\right)$ (B) $y = \sin(\pi x)$ (C) $y = 2\sin(2x)$

(D) $y = 2\sin(\pi x)$ (E) $y = \sin(2x)$

amp = 2
no shifting

36. If $f$ is a continuous function defined for all real numbers $x$ and if the maximum value of $f(x)$ is 5 and the minimum value of $f(x)$ is $-7$, then which of the following must be true?

max $f(?) = 5$
min $f(?) = -7$

I. The maximum value of $f(|x|)$ is 5. depends on $f(x)$

II. The maximum value of $|f(x)|$ is 7.

$|f(x)| = |-7|$
$= 7$ ✓

III. The minimum value of $f(|x|)$ is 0. b/c of IVT
there exists at least one

(A) I only (B) II only (C) I and II only (D) II and III only (E) I, II, and III

37. $\lim\limits_{x \to 0} (x \csc x)$ is $= \boxed{\lim\limits_{x \to 0} \frac{x}{\sin x}}$

OR try subbing in values (i.e. table) close to zero

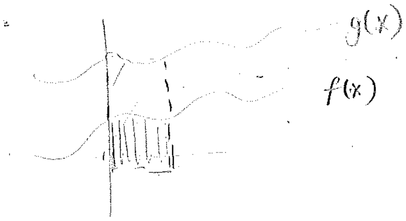
(A) $-\infty$ (B) $-1$ (C) 0 (D) 1 (E) $\infty$

famous ex. of squeeze thm $\Rightarrow \lim\limits_{x \to 0} \frac{\sin x}{x} = 1 \;=\; \lim\limits_{x \to 0} \frac{x}{\sin x} = 1$




$\to$ another ex. of squeeze thm $\Rightarrow \lim\limits_{x \to 0} \frac{1 - \cos x}{x} = 0$

38. Let $f$ and $g$ have continuous first and second derivatives everywhere. If $f(x) \le g(x)$ for all real $x$, which of the following must be true?




~~I.~~ $f'(x) \le g'(x)$ for all real $x$ (+/-) slopes of f(x) aren't dependent on y values

~~II.~~ $f''(x) \le g''(x)$ for all real $x$ (+/-) concavity not dependent on y's

III. $\int_0^1 f(x)\,dx \le \int_0^1 g(x)\,dx$

(A) None (B) I only (C) III only (D) I and II only (E) I, II, and III

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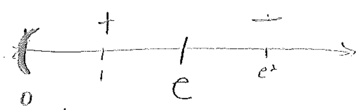
39. If $f(x) = \dfrac{\ln x}{x}$, for all $x > 0$, which of the following is true?

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

$1 - \ln x$
$1 = \ln x$
$x = e$
cp = x = 0, x = e




$\ln 1 = 0$ $\ln e^2 = 2$

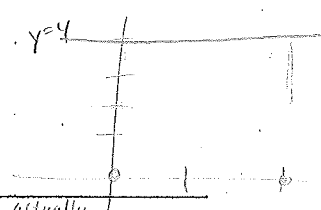
→ f′(x)

~~(A)~~ $f$ is increasing for all $x$ greater than 0.
~~(B)~~ $f$ is increasing for all $x$ greater than 1.
~~(C)~~ $f$ is decreasing for all $x$ between 0 and 1.
~~(D)~~ $f$ is decreasing for all $x$ between 1 and $e$.
(E) $f$ is decreasing for all $x$ greater than $e$.

---

40. Let $f$ be a continuous function on the closed interval $[0,2]$. If $2 \le f(x) \le 4$, then the greatest possible value of $\int_0^2 f(x)\,dx$ is

if y = 4 (couldn't be exactly, since range includes 2 ..) ⇒ $\int_0^2 4\,dx = 4x\Big|_0^2 = 8 - 0 = 8$




(A) 0 (B) 2 (C) 4 (D) 8 (E) 16

$\boxed{\text{OR}}$ area under curve

must actually be a least a little less than 8

---

41. If $\lim_{x\to a} f(x) = L$, where $L$ is a real number, which of the following must be true?

~~(A)~~ $f'(a)$ exists. f(a) doesn't have to = L (i.e. if graph is undefined at a pt., limit can exist there even if y value DNE
~~(B)~~ $f(x)$ is continuous at $x = a$. doesn't need to be contin. for limit to exist
~~(C)~~ $f(x)$ is defined at $x = a$. see (A)
~~(D)~~ $f(a) = L$ see (A)
(E) None of the above

$x^1 = 1$ → so not a factor on this problem (but if other than 1, mult. result by $x^1$)

42. $\frac{d}{dx}\int_2^x \sqrt{1+t^2}\,dt =$ $\sqrt{1+x^2}$ $\boxed{\text{and FTC}}$!

(A) $\frac{x}{\sqrt{1+x^2}}$ (B) $\sqrt{1+x^2}-5$ (C) $\sqrt{1+x^2}$

(D) $\frac{x}{\sqrt{1+x^2}}-\frac{1}{\sqrt{5}}$ (E) $\frac{1}{2\sqrt{1+x^2}}-\frac{1}{2\sqrt{5}}$

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43. An equation of the line tangent to $y = x^3+3x^2+2$ at its point of inflection is

$y' = 3x^2+6x$ at $x=-1$ = $3(-1)^2+6(-1) = 3-6 = \boxed{-3 = m}$

(A) $y=-6x-6$ (B) $y=-3x+1$ (C) $y=2x+10$

$y'' = 6x+6$ Best answer b/c only one w/ correct slope

(D) $y=3x-1$ $0 = 6(x+1)$ (E) $y=4x+1$

$x=-1$

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

$y - 6 = -3(x+1)$

$y = -3x - 3 + 6$

$(y = -3x+3)$

when $x=-1$, $y = (-1)^3+3(-1)^2+2 = 1+3+2 = 6$ so $(-1,6)$ is P.O.I.

---

44. The average value of $f(x) = x^2\sqrt{x^3+1}$ on the closed interval $[0,2]$ is

$\frac{1}{b-a}\int_a^b f(x) = \frac{1}{2-0}\left(\frac{1}{3}\right)\int_0^2 (x^3+1)^{1/2}(3)x^2\,dx = \frac{1}{6}\int_0^2 (x^3+1)^{1/2}\,3x^2\,dx = \frac{2}{3}\cdot\frac{1}{6}(x^3+1)^{3/2}\Big|_0^2 = \frac{1}{9}\left[9^{3/2} - 1^{3/2}\right]$

(A) $\frac{26}{9}$ (B) $\frac{13}{3}$ (C) $\frac{26}{3}$ (D) 13 (E) 26

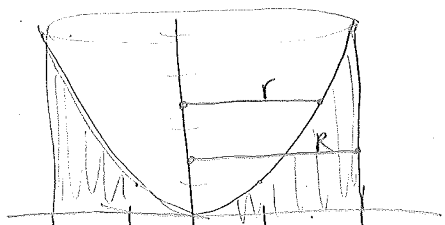
$\frac{1}{9}[27-1]$

$\frac{26}{9}$

---

45. The region enclosed by the graph of $y = x^2$, the line $x = 2$, and the $x$-axis is revolved about the $y$-axis. The volume of the solid generated is

(A) $8\pi$ (B) $\frac{32}{5}\pi$ (C) $\frac{16}{3}\pi$ (D) $4\pi$ (E) $\frac{8}{3}\pi$




$V = \pi\int_0^4 2^2 - \sqrt{y}^2\,dy = \pi\int_0^4 4-y\,dy$

$\pi\left(4y - \frac{y^2}{2}\right)\Big|_0^4$

$\pi\left[(16-8)-(0-0)\right]$

$8\pi$

in terms of $y$!

$R = 2$

$r = x = \sqrt{y}$

$\sqrt{y} = \sqrt{x^2}$ $\sqrt{y} = x$