

MATH 152 TEST 1 SHOW ALL WORK ; BE NEAT ;

USE ONE SIDE OF EACH PAGE ONLY

1. $\int x^{10} + \frac{x^7}{7} + \pi + x^{-4} + x^{-1/2} dx = ?$ 2. $\int_1^2 x^2 dx = ?$

3. $\int (x-4)^{100} dx = ?$ 4. $\int_1^9 \frac{x+2}{\sqrt{x}} dx = ?$

5. $\int_1^{\sqrt[3]{2}} \frac{x^2 dx}{(x^3+1)^2} = ?$ 6. $\int (x^2+1)^{1/2} x^3 dx = ?$

7. Find all c between a & b that satisfy

$$\int_a^b f(x) dx = f(c)(b-a) \quad \text{when} \quad \begin{array}{l} a = -2 \\ b = 0 \end{array}$$

$$f(x) = 3x^2 + 1.$$

8. $\int_0^{10} f(x) dx = ?$ where $f(x) = \begin{cases} 7 & 0 \leq x \leq 5 \\ -2 & 5 < x \leq 7 \\ 0 & 7 < x \leq 8 \\ 4 & 8 < x \leq 10. \end{cases}$

9. Find the area between the curves $y = x$

$$y = -x^2 + 6x - 4$$

10. If $B_n = \frac{1}{n^2} \sum_{i=1}^n (2i+n)$ find

$$\lim_{n \rightarrow \infty} B_n. \quad (\text{SHOW ALL WORK}).$$

1. $\int x^{\frac{1}{2}} + x^{\frac{3}{2}} + 10x^9 + \frac{1}{2} + 2x^{-2} dx = ?$

2. $\int_{13}^8 (x-4)^{-\frac{1}{2}} dx = ?$ 3. $\int (x^3 + x + 1)^{10} (6x^2 + 2) dx = ?$

4. $\int_9^1 \frac{\sqrt{x}}{3x+1} dx = ?$ 5. $\int (x^2+1)^{\frac{1}{2}} x^3 dx = ?$

6. $\int_{10}^1 t(t^2-1)^{\frac{1}{2}} dt = ?$

7. If $P(t)$ is the power in kw and t in hours find the amount of work used between $t=1$ & $t=10$ where $P(t) = t^2 + t^{-2}$

8. If $y = 2\sin x + \sin 2x + \sin^2 x + \sin x^2 + \sin(\sin x)$, find y' .

9. $\lim_{x \rightarrow 0} \frac{\sin^2(2x)}{x \sin x} = ?$

10. Find the Area between the curves $x = -1$, $x = 1$, $y = x^3$, $y = x - 1$

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IN 1-3 FIND THE DERIVATIVE

1. $e^{3x} + e^{-x^2} + \ln|x| + e^{2x} + \pi e$

2. $x^{\sqrt{x}}$

3. $\left| \frac{x^2}{(x-1)(x+1)} \right|$

4. $\int e^{5x} dx = ?$

5. Find the equation of the tangent line

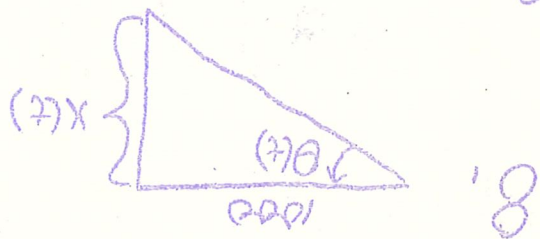
to $y = e^{-x} \sin x$ at $x = \pi$,

6. Show $y(t) = te^{-t}$ satisfies $y'' + 2y' + y = 0$.

7. Find the Area between $y = \sin x$, $y = 0$

$x = 0$ and $x = \frac{\pi}{2}$.

8. Find $\frac{dy}{dt}$ when $x = 500$ and $\frac{dx}{dt} = 7$.



9. Discuss (ie. increasing, decreasing, concavity, pts of inflection) the graph of $y = e^{-\frac{x^2}{2}}$. Sketch it.

10. Find the max value of $f(x) = x^2 e^{-x}$ on $[0, \infty)$. Justify your answer.

1. If $y = 2\sin x + \sin(2x) + \sin^2 x + \sin(x^2) + \sin(\sin(x))$ find y' .

2. $\int \cos tx \, dx = ?$

3. If $f(x) = \ln(x^2+1) + \arctan(\frac{x}{2}) + \tan(\frac{x}{2}) + e^{x^2} + e^{\pi}$ find $f'(x)$

4. If $z = \sec(\arcsin x) + \sec(x^2) + 2^x - \log_2 x + \cos x$ find z' .

5. $\int \sin^3 x \, dx = ?$
 6. $\int_0^{\frac{1}{2}} \frac{dx}{1+4x^2} = ?$

7. $\int \frac{x^3+1}{x^2} dx = ?$
 8. $\int \frac{dx}{\sqrt{10-x^2}} = ?$

9. $\lim_{x \rightarrow 0} \frac{x^2}{[\sin(2x)][\sin(4x)]} = ?$

10. If $y = \sqrt[3]{|x|(x^2+1)} = \sqrt[3]{x^2+1}$ find $\frac{dy}{dx}$.

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1. Find y' if $y = 2^x + \log_3 x + e^x + \frac{1}{x} + \ln|\arctan(2x)|$.

2. $\int \sin(\frac{x}{2}) dx = ?$

3. $\int_{10}^1 \frac{t}{t^2} dt = ?$

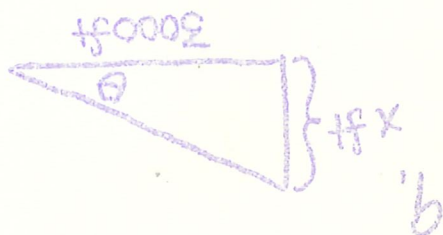
4. Find y' if $y = \ln(\cos(\arctan(e^{-2x})))$.

5. Find the equation of the tangent line to $f(x) = x^x$ at $x=2$.

6. Find the point of intersection of the graphs of $y = 2e^{-x}$ and $y = e^{-2x}$. (both co-ordinates!)

7. $\int \frac{dx}{x^2+4} = ?$

8. Find the relative min's & relative max's (and what's all) of $f(x) = x \exp(x^2/2)$



9. Find $\frac{d\theta}{dt}$ when $x = 4000$ ft if $\frac{dx}{dt} = -3$ ft/sec.

10. Find the equal angles θ of the isosceles triangle with equal sides of length 10 with the maximum area.

SHOW ALL WORK BE NEAT

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1. $\int 3x^3 + x^{\frac{1}{2}} + \frac{1}{x} + x^{-2} + x^{-1} dx = ?$

2. $\int_0^{\frac{\pi}{2}} \cos \theta d\theta = ?$ 3. $\int_0^3 (t^2+1)^9 t dt = ?$

4. $\int \frac{\sqrt{x}}{x^3+x^2+x} dx = ?$ 5. $\int_{\frac{\pi}{2}}^{\frac{3\pi}{4}} \sin^2 x \cos x dx = ?$

6. $\int \frac{du}{3+u^2} = ?$ 7. $\int_2^4 \frac{y^3 dy}{(y^2+1)^3}$

8. $1+2+3+4+\dots + 998+999+1000 = ?$

9. $\int_5^7 f(x) dx = ?$ if $f(x) = \begin{cases} 3 & 1 \leq x \leq 2 \\ x+1 & 2 \leq x \leq 3 \\ -1 & 3 \leq x \leq 5 \end{cases}$

10. $\frac{d}{dx} (e^{-x^3} + \log_{10} x + 8^{2x} + \arcsin(\frac{1}{x}) + e^7) = ?$

11. $\frac{d}{dx} (\sin x^2 + \tan(\cos x) + \cos^2 x + \ln|x+1| + \frac{1}{x}) = ?$

12. $\left[\ln(\tan(\arctan(e^{3x}))) \right]' = ?$

13. Find The Area between the x-axis $y = e^x$ $x=0$ and $x = \ln 3$.

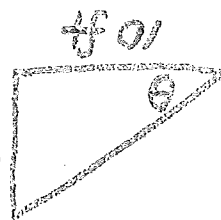
14. Find the Area between $y=x^2$ and $y=8-x^2$

2. FIND THE EQUATION OF THE TANGENT LINE

TO $y = \arcsin x$ AT $x = \frac{1}{2}$.

16. IF $y = x^{\cos x}$ FIND y' .

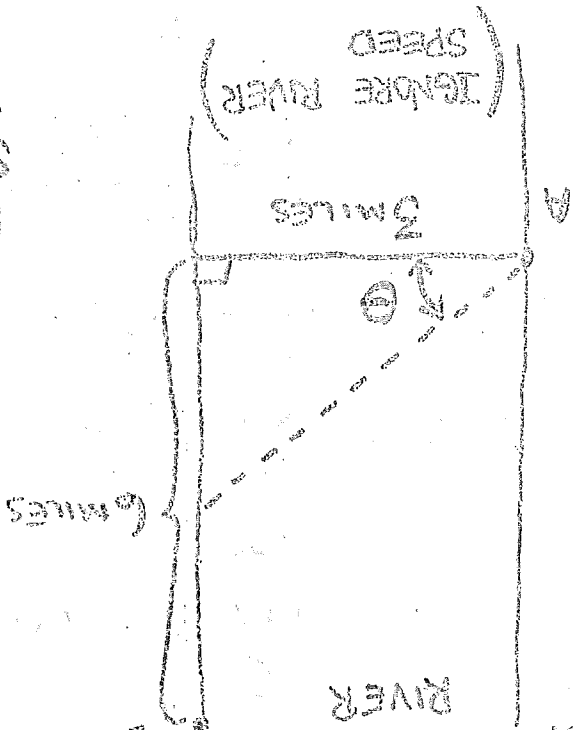
17. $\lim_{x \rightarrow 0} \frac{\sin x}{x} = ?$



18. FIND HOW FAST THE AREA OF THE TRIANGLE IS INCREASING IF $\frac{d\theta}{dt} = \frac{1}{5}$ rad/sec. AT $\theta = \frac{\pi}{3}$.

19. GRAPH $f(x) = xe^x$ GIVING ALL REL MIN AND REL MAXS AND PTS OF INFLECTIONS.

20.



A MAN AT POINT A ON ONE SIDE OF THE RIVER WISHES TO REACH POINT B THE OTHER SIDE OF THE RIVER (WHICH IS 3 MILES WIDE & HAS PARALLEL EDGES). FIND THE ANGLE θ HE SHOULD TAKE TO MAKE THE TIME AS SHORT AS POSSIBLE IF HE ROWS AT 3 MPH AND WALKS AT 6 MPH.

HINT: (RATE)(TIME) = DISTANCE.
 2nd HINT: $\sec \theta \tan \theta = \sec^2 \theta \sin \theta$