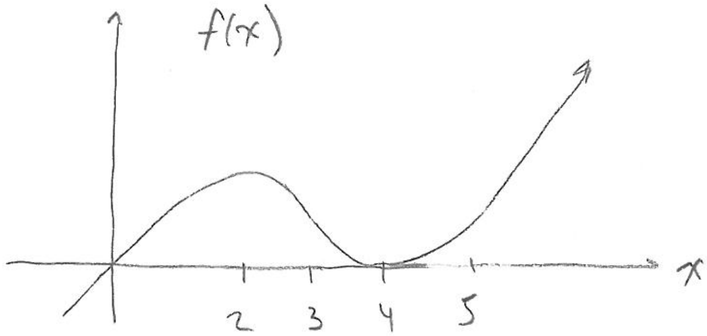
MATH 1300 REVIEW

1. FOR THE FUNCTION $f(x)$ BELOW, GRAPH ITS DERIVATIVE



2. $\lim_{x \to \infty} x e^{-x} =$

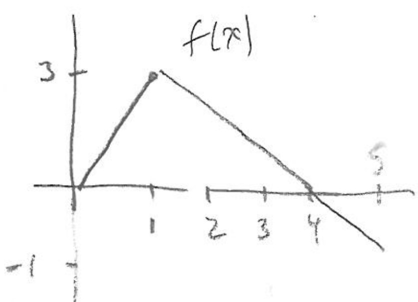
3. $f(x) = x^4 - 4x^3$. ON WHAT OPEN INTERVALS IS $f(x)$ INCREASING/DECREASING? ON WHAT OPEN INTERVALS IS $f(x)$ CONCAVE UP/CONCAVE DOWN?

4. HOW LONG DOES IT TAKE ON MARS FOR A ROCK DROPPED FROM 16 FT. TO HIT GROUND? ($g \approx -4$ FT/SEC)

5. FIND THE AVERAGE VALUE OF $f(x) = \dfrac{\sqrt{x} + x + 1}{x^2}$ ON $[1, 3]$

6. FIND THE AREA OF THE REGION BOUNDED BY $f(x) = 2x$ AND $f(x) = x^2 - 4x$

7.



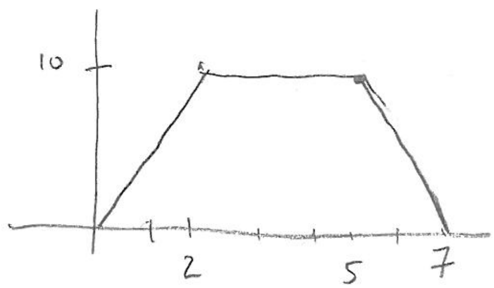
$f(x)$ IS SHOWN.

$F(x) = \int_1^x f(t)\,dt$.

GRAPH $F(x)$

8. A PLANE FLYING HORIZONTALLY AT AN ALTITUDE OF 1 MILE AND A SPEED OF 500 miles/hr PASSES OVER A RADAR STATION. FIND THE RATE AT WHICH THE DISTANCE FROM THE PLANE TO THE STATION INCREASES WHEN THE PLANE HAS GONE 2 MILES FROM THE POINT DIRECTLY OVER THE STATION

9. HERE IS A GRAPH OF A VELOCITY FUNCTION $v(t)$



The position AT $t=2$ IS 8. IF $s(t)$ IS THE POSITION FUNCTION, FIND $s(0)$, $s(1)$, $s(2)$, $s(4)$, $s(7)$

IF $a(t)$ IS ACCELERATION, FIND $a(1)$, $a(4)$, $a(6)$

10. MAKE UP A PROBLEM LIKE #9, WITH DATA GIVEN RATHER THAN A GRAPH

11. A RECTANGULAR BOX WITH A SQUARE BASE USES 1000 cm^2 OF MATERIAL FOR ITS SIDES. WHAT IS THE MAX VOLUME?

12. TAKE THESE DERIVATIVES:

a) $f(x) = \sqrt{\arctan x}$ $\qquad f'(x) =$

b) $f(x) = \int_{-x}^{x^3} \tan t \, dt$ $\qquad f'(x) =$

c) $f(x) = \dfrac{x}{\ln x}$ $\qquad f'(x) =$

13. INTEGRALS:

a) $\int \sec^2 x \, dx =$

b) $\int_0^2 x e^{x^2} dx =$

c) $\int 10^x \, dx =$

d) $\int_0^1 \dfrac{1}{1+x^2} dx$

e) $\int_0^1 \dfrac{x}{1+x^2} dx$

14. STATE THE DEFINITION OF DERIVATIVE AND USE IT TO CALCULATE THE DERIVATIVE OF $f(x) = 3x^2 + 4x$

15. ESTIMATE $\sqrt[3]{8.3}$