2008 Practice Exam Solutions

Part B

(76) $v(t) = t^2 \ln(t+2)$

on calculator

Math 8

nDeriv $(x^2 \ln(x+2), x, 6) = 29.453$

(77) $\int_0^3 f(x)\,dx = 6 \quad \int_3^5 f(x)\,dx = 4 \quad \int_0^5 f(x)\,dx = \int_0^3 f(x)\,dx + \int_3^5 f(x)\,dx$

$= 10$

$$\int_0^5 3 + 2f(x)\,dx = \int_0^5 3 + 2\int_0^5 f(x)\,dx = 15 + 2(10) = \boxed{35}$$

(78) $H'(24)$ is the rate of change of the temp at the end of the 24th hour.

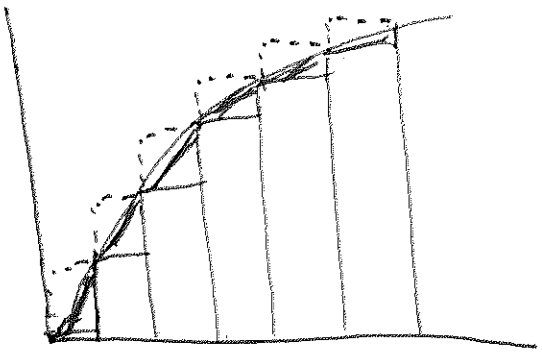
(79) $81.637 - \int_0^6 9\sin\left(\sqrt{t+1}\right)dt =$

$81.637 -$ Math 9

fnInt $(9\sin(\sqrt{(x+1)}), x, 0, 6)$

$\boxed{36.60598077}$

(80)

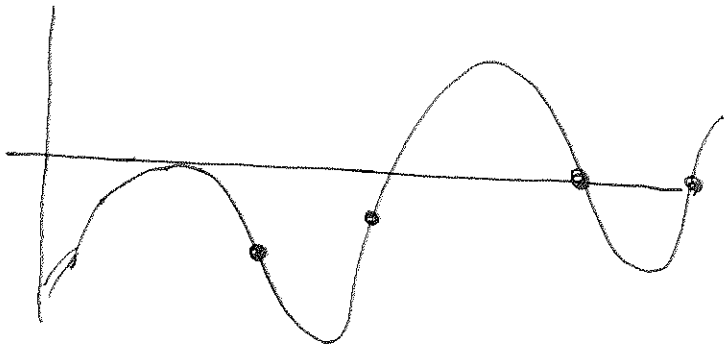


- left under approximates
-- right over approximates
▬ Trapezoid under approx.

I & III only

(81) $f'(x) = x - 4e^{\sin(2t)}$

graph shows 4 points of inflection



Changes in Concavity

(82) c) There is a number c on the closed interval $[a,b]$ such that $f(c) \geq f(x)$ for all x in $[a,b]$. This means there is a maximum value guaranteed by the Mean Value Theorem

(83) Slope : $\frac{\Delta y}{\Delta x}$ Slope from 2.8 to 3.1

$\frac{\Delta y}{\Delta x} = \frac{48.05 - 39.20}{3.1 - 2.8} = \frac{8.85}{.3} = 29.5$ This answer was between 2 answers * Needs to be refined

Consider slope from 2.8 to 3.0

$\frac{\Delta y}{\Delta x} = \frac{45 - 39.2}{3.0 - 2.8} = 29$

And the slope from 3.0 to 3.1

$\frac{\Delta y}{\Delta x} = \frac{48.05 - 45}{3.1 - 3.0} = 30.5$

Now average these 2 slopes

$\frac{29 + 30.5}{2} = 29.75$

ANSWER D

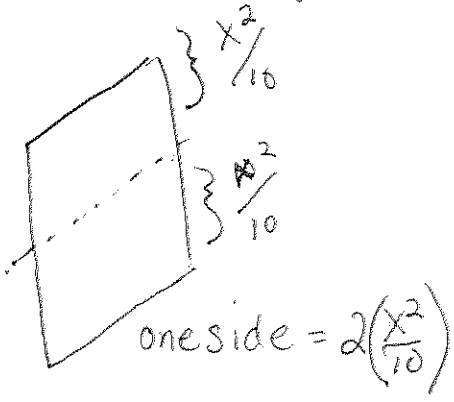
(84) Function is decreasing on $[0,2]$: $[4,6]$

These are intervals where the graph is below the X-axis

(85) Cross-section is a square so to determine Volume by integrating the area of the square

$$V = \int_1^4 5^2 dx = \int_1^4 \left(\frac{x^2}{5}\right)^2 dx = \int_1^4 \frac{x^4}{25} dx$$

$$\frac{x^5}{125}\Big]_1^4 = \frac{4^5}{125} - \frac{1}{125} = 8.184$$



(86) I: There may be a value around $X=5$ where $f(x) < 12$.

II: Since values of $f(x)$ are decreasing from $[3 \text{ to } 5]$ and increasing from $[5 \text{ to } 7]$ there is some value where there is a minimum value ie $f'(c) = 0$

III: We only know the discrete values @ 5, 6, 7
It is possible for there to be a dip (ie neg slope) between one of these values.

∴ only II must be true.

(87) Relative maximum occurs when the slope goes from positive to negative. On the graph this occurs when graph goes from +y to -y. This only occurs one time.

(88) $R(t) = 2\sqrt{1+5t^3} \qquad 0 \le t \le 4$

Average rate: $\frac{1}{b-a}\int_a^b f(x)\,dx$

$$\frac{1}{4}\int_0^4 2\sqrt{1+5t^3}\,dt = \boxed{14.691}$$

(89) $h(x) = (2f(x)+3)(1+g(x))$

$h'(x) = (2f(x)+3)(g'(x)) + (2f'(x))(1+g(x))$

$h'(x) = (2(3)+3)(4) + 2(-2)(1+-3) = \boxed{44}$

(90) $f(g(x)) = x \quad g(f(x)) = x$

This tells you that $f(x)$ and $g(x)$ are inverse functions

$\therefore$ if $f(3) = 8 \quad g(8) = 3$

Inverse functions have reciprocal slopes so

$f'(3) = 9 \qquad g'(8) = 1/9$

(91) $v(t) = 5te^{-t} - 1$

Total distance traveled is the integral of the absolute value of $v(t)$

$$D = \int_0^4 |v(t)|\, dt = 1.821$$

Math 9

Math

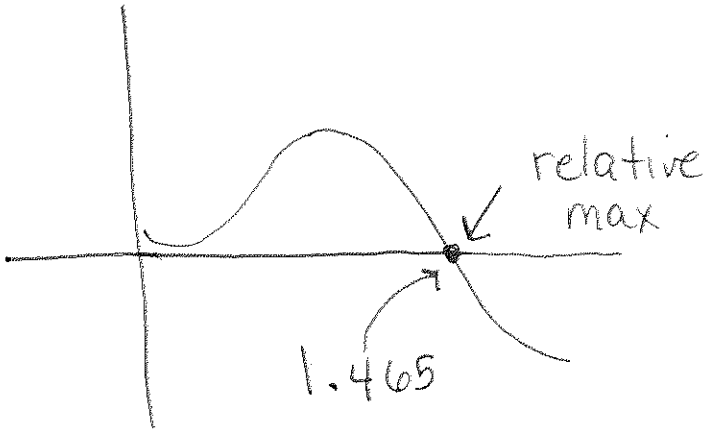
Num

1 abs

fnInt (abs (5×eˆ(-X)-1, X, 0, 4)

(9a) $f'(x) = \sin(x^3)$ for $0 \le x \le 2$

Max occurs when $f'(x) = 0$



graph function
Use calc
Zero
to find value