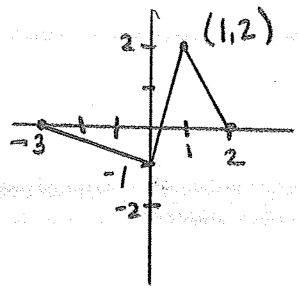
Honors Calculus
Review Worksheet on 4.1-4.3

Name Key Hour____

No Calculator.

1. Find the relative minimum and maximum values (y-coordinates) of the graph below.



Minimom : −1, 0

maximum : 2, 0

2. Find the values of the x of where the extreme values of the function occur.

$y = (1/3)x^3 + 3x^2 + 8x - 3$

$y' = x^2 + 6x + 8$

Critical Points

1. $f' = 0$ $\quad x^2 + 6x + 8 = 0$

$(x + 4)(x + 2) = 0$

$x = -4,\ x = -2$

2. $f' =$ und None

3. Endpoints None

f': + −4 − −2 +

maximum $x = -4$
minimom $x = -2$

3. Find the relative minimum of value of the function $f(x) = (2/3)X^3 + 4X^2 + 6X$.

$f'(x) = 2x^2 + 8x + 6$

1. $f' = 0$ $\quad 0 = 2(x^2 + 4x + 3)$

$= 2(x + 3)(x + 1)$

$x = -3,\ f = -1$

2. $f' =$ und None

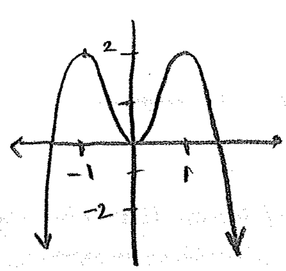
3. Endpoints : None

f': + −3 − −1 +

Minimum : $-2\frac{2}{3}$

$\frac{2}{3}(-1)^3 + 4(-1)^2 + 6(-1)$ (−1,) $-\frac{2}{3} + 4 - 6 = -\frac{2}{3} - 2$

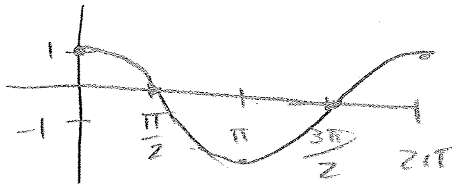
4. Find the interval or intervals of which the function below is increasing, decreasing, or constant.



increasing : (−∞, −1], [0, 1]

decreasing : [−1, 0], [1, ∞)

5. **The graph of $y = \cos x$ is concave down on what interval between $0 \le x \le 2\pi$.**



Concave down: $(0, \frac{\pi}{2}) + (\frac{3\pi}{2}, 2\pi)$

Concave Up: $(\frac{\pi}{2}, \frac{3\pi}{2})$

6. **Find the function whose derivative is $f'(x) = 4x - 2$ and whose graph passes through the point P (1, 2).**

$f'(x) = 4x - 2$

$f(x) = \frac{4x^2}{2} - 2x + C$

$f(x) = 2x^2 - 2x + C$

$2 = 2(+1)^2 - 2(+1) + C$

$2 = 2 + {}^-2 + C$

$2 = 0 + C$

$2 = C$

$\boxed{f(x) = 2x^2 - 2x + 2}$

7. **State whether or not the function satisfies the hypotheses of the Mean Value Theorem on the given interval, and if it does, find each value of c in the interval (a,b) that satisfies the Mean Value Theorem for Derivatives.**

$f'(c) = \frac{f(b) - f(a)}{b - a}$ $\qquad f'(x) = 2x + 5$

$f(x) = x^2 + 5x + 3$ on $[0, 3]$

$\frac{f(3) - f(0)}{3 - 0} = \frac{9 + 15 + 3 - (3)}{3} = \frac{24}{3} = 8 = m$

$2x + 5 = 8$

$2x = 3$

$x = \frac{3}{2}$

$\boxed{c = \frac{3}{2}}$

8. **Given $f(x) = x^3 - 12x - 5$. Find all critical points and inflection points. Determine the intervals where the function is increasing and decreasing. Determine intervals where the function is concave up and concave down.**

Critical Points

1. $f' = 0$ $\quad 3x^2 - 12 = 0$

$3(x^2 - 4) = 0$

$\boxed{x = \pm 2}$

2. $f' =$ und None

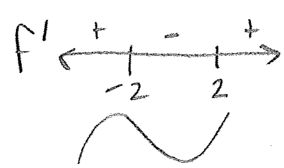
Note: No endpts

inflection Pts

$f'' = 0$

$f'' = 6x$

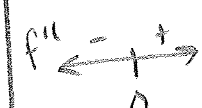
$\boxed{x = 0}$



$\boxed{\begin{array}{l}\text{increasing}: (-\infty, -2] + [2, \infty) \\ \text{decreasing}: [-2, 2]\end{array}}$

$f'' < 0$ Conc. down

$f'' > 0$ Conc. Up



Concave down: $(-\infty, 0)$

Concave Up: $(0, \infty)$