

SCORE: ___ / 20 POINTS

What day of the month is your birthday? ___

What are the last 2 digits of your address? ___

What are the last 2 digits of your zip code? ___

What are the last 2 digits of your social security number? ___

[IF YOU DO NOT HAVE A SOCIAL SECURITY NUMBER,
USE YOUR STUDENT ID NUMBER]

Use Newton's method to find $\sqrt[4]{77}$. For full credit, you must show all intermediate values generated by Newton's method. You do NOT need to show the calculations used to generate those intermediate values.

SCORE: ___ / 4 POINTS

$$x^4 - 77 = 0$$

$$x_0 = 3$$

$$x - \frac{x^4 - 77}{4x^3} \rightarrow x$$

$$x_1 = 2.962962963$$

$$x_2 = 2.96225689$$

$$x_3 = 2.962256638 = x_4 = x_5 \dots = \sqrt[4]{77}$$

Find the exact value of the following limits. For full credit, you must show all algebraic work.

SCORE: ___ / 10 POINTS

DECIMAL APPROXIMATIONS ARE NOT ACCEPTABLE.

[a] $\lim_{x \rightarrow 1} (x^2 - 1) \cot \pi x$

$$= \lim_{x \rightarrow 1} \frac{x^2 - 1}{\tan \pi x} \quad \frac{0}{0}$$

$$= \lim_{x \rightarrow 1} \frac{2x}{\pi \sec^2 \pi x} \quad 3$$

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

[b] $\lim_{x \rightarrow 0} \frac{\arctan x}{4^{2x} - 1} \quad \frac{0}{0}$

$$= \lim_{x \rightarrow 0} \frac{\frac{1}{1+x^2}}{(2 \ln 4) 4^{2x}} \quad 4$$

$$= \frac{1}{2 \ln 4} \quad 1$$

Find the exact locations of all global maxima and minima of $f(x) = x^2 - \sqrt[3]{x}$ on $[-1, 1]$.

SCORE: ___ / 6 POINTS

For full credit, you must show all relevant calculus work. You may use your calculator to find function values for specific values of x .

$$f'(x) = 2x - \frac{1}{3}x^{-\frac{2}{3}} \quad \text{UNDEFINED AT } x=0 \quad \text{IN DOMAIN OF } f$$

$$\frac{1}{3}x^{-\frac{2}{3}}(6x^{\frac{5}{3}} - 1) = 0$$

$$x = \left(\frac{1}{6}\right)^{\frac{3}{5}}$$

$$\frac{1}{2} \text{ MAX } (-1, 2)$$

$$\frac{1}{2} \text{ MIN } \left(\left(\frac{1}{6}\right)^{\frac{3}{5}}, -0.582\right)$$

x	$f(x)$
-1	2
0	0
$\left(\frac{1}{6}\right)^{\frac{3}{5}}$	-0.582
1	0