

Math 2310 - Test 3

Name: _____

Do not use a calculator and show all work.

1. Let $f(x) = 2x^3 - 9x^2 + 12x - 7$.
 - (a) Draw the first derivative number line. Use it to classify all critical points.
 - (b) Draw the second derivative number line. Use it to classify all possible points of inflection.

2. Let $f(x) = x^5 - 5x$. Graph $f(x)$ labeling the critical points.

3. We wish to build a rectangular pen of 600 square feet with fencing that will cost \$3.00 foot on the north and south faces of the pen and \$2.00 per foot for fencing on the east and west faces. If we want to minimize the cost of the pen, what are the dimensions of the fence (and what is the cost)?

4. Compute the following limits; show all work.

(a) $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2}$

(b) $\lim_{x \rightarrow 0} \frac{\sin(1 - e^x)}{x}$

(c) $\lim_{x \rightarrow 0} \frac{\sin(x)(1 - \cos(x))}{x^3}$

(d) $\lim_{x \rightarrow 0^+} \frac{1}{x}$

(e) $\lim_{x \rightarrow 0^+} (1 + 2x)^{\frac{1}{x}}$

(f) $\lim_{n \rightarrow \infty} (1 + \frac{2}{n})^n$

(g) $\lim_{x \rightarrow 0^+} (1 + x)^{e^x}$

(h) $\lim_{x \rightarrow 0^+} (1 + x)^{e^{-x}}$

5. Compute the following antiderivatives.

(a) $\int 2x^3 - \frac{4}{x} - 7 \cos(x) \, dx$

(b) $\int e^x - \sec(x) \tan(x) \, dx$

(c) $\int \frac{2}{1+x^2} + \frac{1+x^2}{2} \, dx$

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