

Math 181 Honors Exam 2 Version A

1. Convert the repeating decimal $3.\overline{10}$ to a fraction.

2. Solve the inequality $x^2 \geq \frac{8}{x}$.

3. Use the δ - ϵ definition of limit to verify $\lim_{x \rightarrow 3} x^2 = 9$.

Math 181 Honors Exam 2 Version A

4. Use the limit laws to find the following limits.

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

(ii) $\lim_{x \rightarrow \infty} \frac{x^2 - 1}{x^2 + x - 2}$

(iii) $\lim_{x \rightarrow 1} \frac{x^2 - 1}{x^2 + x - 2}$

(iv) $\lim_{x \rightarrow -2^+} \frac{x^2 - 1}{x^2 + x - 2}$

Math 181 Honors Exam 2 Version A

5. Fill in the derivatives in the following table:

$$\frac{d}{dx} x^r = \boxed{}$$

$$\frac{d}{dx} \frac{1}{x^r} = \boxed{}$$

$$\frac{d}{dx} \sin x = \boxed{}$$

$$\frac{d}{dx} \arcsin x = \boxed{}$$

$$\frac{d}{dx} \cos x = \boxed{}$$

$$\frac{d}{dx} \arccos x = \boxed{}$$

$$\frac{d}{dx} \tan x = \boxed{}$$

$$\frac{d}{dx} \arctan x = \boxed{}$$

6. State the definition of derivative in terms of limits.

7. Suppose $f(x) = \sqrt{x}$. Use the limit laws to verify $f'(x) = \frac{1}{2\sqrt{x}}$.

Math 181 Honors Exam 2 Version A

8. Use Calculus to find the following derivatives.

(i) $\frac{d}{dx}(x^5 + 4^3 + 3^2)$

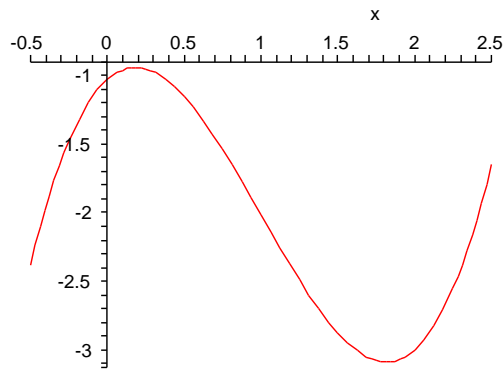
(ii) $\frac{d}{dx} \frac{x^3}{1+x^2}$

(iii) $\frac{d}{dx} \sin(5 \arctan x)$

(iv) $\frac{d}{dx} \arcsin\left(\frac{1}{1+x^2}\right)$

Math 181 Honors Exam 2 Version A

9. Consider the function $f(x) = x^3 - 3x^2 + x - 1$ graphed below



- (i) Find the critical points of $f(x)$ on the interval $[0, 2]$.
- (ii) Find the maximum value of $f(x)$ on the interval $[0, 2]$.
- (iii) Find the minimum value of $f(x)$ on the interval $[0, 2]$.