Math 181 Honors Exam 2 Version B

1. Convert the repeating decimal $2.1\overline{7}$ to a fraction.

2. Solve the inequality $\dfrac{(x-1)(x-3)}{(x-2)(x-4)} \geq 0$.

3. Use the δ-ϵ definition of limit to verify $\displaystyle\lim_{x \to 3} \frac{1}{x} = \frac{1}{3}$.

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

(i) $\lim\limits_{x \to 3} \dfrac{x^2}{2 - x}$

(ii) $\lim\limits_{x \to \infty} \dfrac{x^2}{2 - x}$

(iii) $\lim\limits_{x \to 2+} \dfrac{x^2}{2 - x}$

(iv) $\lim\limits_{x \to 1} \dfrac{x - 1}{x^2 - 1}$

5. Fill in the derivatives in the following table:

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

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

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

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

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

7. Suppose $f(x) = x^2$. Use the limit laws to verify $f'(x) = 2x$.

Math 181 Honors Exam 2 Version B

8. Use Calculus to find the following derivatives.
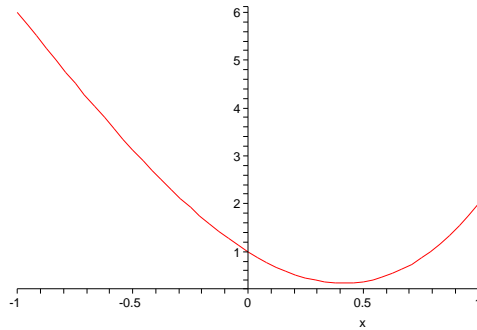
(i) $\dfrac{d}{dx}\dfrac{\sqrt{x}}{x}$

(ii) $\dfrac{d}{dx}\dfrac{\arctan x}{3+\cos x}$

(iii) $\dfrac{d}{dx}\sin^2(3x-4)$

(iv) $\dfrac{d}{dx}\arccos(\arcsin x)$

Math 181 Honors Exam 2 Version B

9. Consider the function $f(x) = x^3 + 3x^2 - 3x + 1$ with domain $[-1, 1]$ graphed below

(i) Find the critical points of $f(x)$ on the interval $[-1, 1]$.

(ii) Find the maximum value of $f(x)$ on the interval $[-1, 1]$.

(iii) Find the minimum value of $f(x)$ on the interval $[-1, 1]$.