

Find the MC part of the exam (you have this). I have placed your answers (including the correct answers) on your desk. Please start to look these over.

We will take part two of the exam on Friday. This will consist of TWO free response questions; one calculator active and one calculator inactive.

$$\lim_{x \rightarrow -\infty} \frac{5x^3 + 18}{20x^2 + 10x + 9} = \frac{-\infty}{+\infty}$$

$$\lim_{x \rightarrow -\infty} \frac{-5x^3 + 18}{20x^2 + 10x + 9}$$

$$f(x) = \frac{x^2}{\cos x}$$

$$f'(x) = ?$$

$$\frac{\cos x(2x) - (-\sin x)(x^2)}{(\cos x)^2}$$

$$\frac{\cos(2x) + x^2 \sin x}{(\cos x)^2}$$

$$y' = x^2 - 10x$$

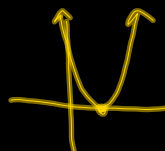
$$y'' = 2x - 10$$

$$0 = 2x - 10$$

$$x = 5$$

second deriv
changes sign
@ $x = 5$
 \therefore P.O.T.

$$f''(x) = (x-2)^2 \rightarrow = 0 \text{ when } x = 2$$



The second deriv = 0
@ $x = 2$ BUT the f''
does NOT change sign
@ $x = 2 \therefore x = 2$ is not a P.O.T.

$$\textcircled{6} \quad f(3) = 0$$

$$f'(3) = 5$$

$$g(3) = 2$$

$$g'(3) = \frac{1}{2}$$

Find $h'(3)$.

$$h(x) = \frac{f(x)}{g(x)}$$

$$h'(x) = \frac{g \cdot f' - f \cdot g'}{[g(x)]^2}$$

$$h'(3) = \frac{2 \cdot 5 - 0 \cdot \frac{1}{2}}{2^2} = \frac{10}{4} = \frac{5}{2}$$

B

$$f(x) = x^3$$

$$g(x) = \sqrt[3]{x}$$

① Find $f(g(x))$.

② Find $g(f(x))$.

②.25 $f'(x) = 3x^2$

②.75 $g'(x) = \frac{1}{3\sqrt[3]{x^2}}$

$$(\sqrt[3]{x})^3 = x$$

$$\sqrt[3]{x^3} = x$$

f and g
are
inverses

③ Fill in the chart:

| x | -8 | -1 | 0 | 1 | 2 | 8 | 10 |
|---------|----------------|---------------|--------|---------------|--------------------------|----------------|----------------------------|
| $f'(x)$ | 192 | 3 | 0 | 3 | 12 | 192 | 300 |
| $g'(x)$ | $\frac{1}{12}$ | $\frac{1}{3}$ | undef. | $\frac{1}{3}$ | $\frac{1}{3\sqrt[3]{4}}$ | $\frac{1}{12}$ | $\frac{1}{3\sqrt[3]{100}}$ |

f & g are inverses

$$f(x) = x^2$$

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

$$x \geq 0$$

$$x^{1/2} \rightarrow \frac{1}{2}x^{-1/2}$$

$$g(x) = \sqrt{x}$$

$$g'(x) = \frac{1}{2\sqrt{x}}$$

| | | | | | | | | | |
|-------|---------------|---------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------|---------------|---------------|
| x | 0 | 1 | $\sqrt{2}$ | 2 | $\sqrt{3}$ | 3 | 4 | 9 | 16 |
| f(x) | 0 | 1 | 2 | 4 | 3 | 9 | 16 | 81 | 256 |
| g(x) | 0 | 1 | $\sqrt{2}$ | $\sqrt{4}$ | $\sqrt{3}$ | $\sqrt{9}$ | 2 | 3 | 4 |
| f'(x) | 0 | 2 | $2\sqrt{2}$ | 4 | $2\sqrt{3}$ | 6 | 8 | 18 | 32 |
| g'(x) | $\frac{1}{2}$ | $\frac{1}{2}$ | $\frac{1}{2\sqrt{2}}$ | $\frac{1}{2\sqrt{4}}$ | $\frac{1}{2\sqrt{3}}$ | $\frac{1}{2\sqrt{9}}$ | $\frac{1}{4}$ | $\frac{1}{6}$ | $\frac{1}{8}$ |

⑤ $f(x) = x^3 - 2x^2 + 8x + 4$ $g'(5) = ?$

$$f'(x) = 3x^2 - 4x + 8$$

$$f'(5) = 63$$

$$g'(5) = \frac{1}{63}$$

$$g'(x) = \frac{1}{f'(x)}$$

From chart

$$f'(2) = 4 \quad g'(4) = \frac{1}{4}$$

$$f(g(x)) = x$$

Chain Rule Impl.

$$f'(g(x)) \cdot g'(x) = 1$$

$$g'(x) = \frac{1}{f'(g(x))}$$

$$f: (a, f(a))$$

$$g: (f(a), a)$$

$$g'(5) = \frac{1}{f'(g(5))}$$

$$g(5)$$

$g(5)$ is the output on the inverse of $f(x)$. The corresp. x-value is 5.