Quiz 5 **Calculus 1** **3/17/2006**

Each problem is worth 5 points. Clear and complete justification is required for full credit.

1. Find the absolute maximum and absolute minimum values of $f(x) = x^3 + 3x^2 - 24x$ on the interval [-5, 4].

$f'(x) = 3x^2 + 6x - 24$ → find derivative

$0 = 3(x^2 + 2x - 8)$ → set equal to zero and solve for x.

$f'(0) = 3(x+4)(x-2)$

$x = \{-4, 2\}$

Determine minimum and maximum by plugging into original equation:

$f(-5) = (-5)^3 + 3(-5)^2 - 24(-5)$ vs. $f(-4) = (-4)^3 + 3(-4)^2 - 24(-4)$ vs. $f(2) = (2)^3 + 3(2)^2 - 24(2)$ vs. $f(4)$

$f(-5) = 70$ vs. $f(-4) = 80$ vs. $f(2) = -28$ $f(4) = 16$

Beautiful

absolute maximum: $f(-4) = 80$

absolute minium : $f(2) = -28$

2. Find the absolute maximum and absolute minimum values of $g(x) = \dfrac{\ln x}{x}$ on the interval ~~[0, 2]~~. [1, 3]

$$g'(x) = \frac{\frac{1}{x} \cdot x - \ln x \cdot 1}{x^2}$$

$$g'(x) = \frac{1 - \ln x}{x^2}$$

$$x^2 \cdot 0 = \frac{1 - \ln x}{x^2} \cdot x^2$$

$$0 = 1 - \ln x$$

$$-1 = -\ln x$$

$$1 = \ln x$$

$$x = e$$

which is about ≈ 2.7182

$\boxed{g(1) = 0}$ min

$g(3) = .3662$

max $\boxed{g(e) = \frac{1}{e}}$ which is about .36788

Wonderful

5