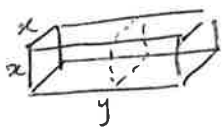
Quiz 7 (L17-L19)

Show all work for full credit.

1. What is the indefinite integral of $e^{2x}+1$? (5 pts.)

$\frac{1}{2}e^{2x} + x + C$

2. The US postal service will accept a box for domestic shipping only if the sum of its length and girth (distance around) do not exceed 96 in. What dimensions will give a box with a square end the maximum volume? (5 pts.)



girth $= 4x$

sum of length and girth $= 4x+y = 96$

Volume $V = x^2y = x^2(96-4x) = 96x^2 - 4x^3$

$V' = 192x - 12x^2 = 0$

$x(192-12x) = 0$

$x = 0$ or $x = \frac{192}{12} = \frac{96}{6} = 16$

$x = 16$ $y = 32$ or $16 \times 16 \times 32$

3. On what intervals is the function $\ln(x^2-1)$ concave down? (5 pts.)

$f(x) = \ln(x^2-1)$

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

$f''(x) = \frac{(x^2-1)(2) - 2x(2x)}{(x^2-1)^2} = \frac{-2x^2-2}{(x^2-1)^2} \neq 0$ for any x.

$f''(x) < 0$ if $x \neq \pm 1$

$(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$