University of Jordan
Department of Mathematics

Math 101 First Exam (24)

Name: Number: Section: 12:30 2:00 25/10/2008

Q1. Let $f(x) = x^2 + 4x$. If $g(x)$ is obtained by shifting $f(x)$ 2 units to the left and then 1 unit upward, then $g(x) =$ ... $(x+4)^2 - 3$

Q2. Let $\text{Dom}(f) = [1, 7]$. If $g(x) = 2f(x-1)$, then $\text{Dom}(g) =$ ... $2 \le x \le 8 \Rightarrow D = [2, 8]$

Q3. If $f(x) = \dfrac{x+2}{x+1}$, then $\text{Dom}(f \circ f) =$ ... $R - \{-1\}$

Q4. $\cos^{-1}(\cos\dfrac{5\pi}{4}) =$ ... $\cos^{-1}(\cos\frac{\pi}{4}) = \frac{\pi}{4}$

Q5. If $f(x) = \cos^2 x - \sin^2 x + 7$, then $\text{Range}(f) =$ ... $\cos 2x + 7$, $-1 \le \cos 2x \le 1$, $6 \le \cos 2x + 7 \le 8$, $[6, 8]$

Q6. If $f(x) = \ln x + \sqrt{2 - x}$, then $\text{Dom}(f) =$ ... $(-\infty, 2] \cap (0, \infty)$, $(0, 2]$

Q7. If $f(x) = x^3 + x + a$ is an odd function, then $a =$ ... zero (0). $f(-x) = -f(x)$, $x^3 + x$

$Q_1 = x^2 + 4x + (2)^2 = (2)^2 \Rightarrow (x+2)^2 - 4$

$\therefore (x+2+2)^2 - 4 + 1 = (x+4)^2 - 3$

7.5

$Q_3 = \dfrac{\frac{x+2}{x+1} + 2}{\frac{x+2}{x+1} + 1}$ $R - \{-1\}$, $R - \{-\frac{3}{2}\} - R$

$\therefore D_{f \circ f} = R -$

Q_6 $D\sqrt{2-x} = 2 - x \ge 0$

$2 \ge x$

$(-\infty, 2] \cap$

0 2

$x^3 + x + a$

$\cos(\pi - x) =$

$-\cos x$

$-\cos 45$

$-\cos\frac{\pi}{4}$

$= \frac{\pi}{4}$

5×180

225

$4\overline{)900}$

8

10

8

20

$180 - 45$

Alaa Awwad

Q8. Solve $\log_2 x + \log_2(x-7) = \log_3 27$

$\log_2 x(x-7) = \log_3 3^3$

$\log_2(x^2-7x) = 3$

$1 = \frac{\ln(x^2-7x)}{\ln 2}$

$e^{\ln 2} = e^{\ln(x^2-7x)}$

$2 = (x^2-7x)$

$\Rightarrow x^2-7x-2=0$

$x = \frac{7 \pm \sqrt{(-7)^2-4\times-2}}{2}$ (8)

$= \frac{7 \pm \sqrt{49+8}}{2}$

$= \frac{7 \pm \sqrt{57}}{2}$ $\quad x = \frac{7+\sqrt{57}}{2}$

~~$x(x-7)$~~

Q9. Let $f(x) = \frac{e^x-1}{2e^x+1}$. Find $f^{-1}(x)$.

$\log_2(x^2-7x) = 3$

$\frac{\ln(x^2-7x)}{\ln 2} = 3 \Rightarrow$

$3\ln 2 = \ln(x^2-7x)$

$e^{\ln 2^3} = e^{\ln(x^2-7x)}$

$8 = x^2-7x$

~~$3\ln 2 = \ln(x^2-7x)$~~ (5)

$\Rightarrow x^2-7x-8=0$

$x = \frac{7 \pm \sqrt{49-4\times-8}}{2}$

$x = \frac{7 \pm \sqrt{81}}{2}$

$x = \frac{7+9}{2} = 8$

D $\ln = (0, \infty)$

$x = \frac{e^y-1}{2e^y+1}$

$2xe^y + x = e^y - 1$

$2xe^y - e^y = -x-1$

$e^y(2x-1) = -x-1$

$\frac{e^y(2x-1)}{(2x-1)} = \frac{-x-1}{(2x-1)}$

$\ln e^y = \ln\frac{-x-1}{2x-1}$

$f^{-1}(x): y = \ln\left(\frac{-x-1}{2x-1}\right) = \ln\left(\frac{1+x}{1-2x}\right)$