2) If $F(x) = xf(g(x^2))$ where

$g(4) = 2, g'(4) = -3, f(2) = 1, f'(4) = -6, f'(2) = -2$

then $F'(2) =$

(a) -23
(b) -15
(c) 13
(d) 49
(e) -71
(f) none of the above

$$F'(x) = f(g(x^2)) + x\left[f(g(x^2))\right]'$$
$$= f(g(x^2)) + x f'(g(x^2)) \cdot g'(x^2) \cdot 2x$$
$$= f(g(x^2)) + 2x^2 f'(g(x^2)) \cdot g'(x^2)$$

$$F'(2) = f(g(4)) + 8 f'(g(4)) \cdot g'(4)$$
$$= f(2) + 8 f'(2) \cdot (-3)$$
$$= (1) + 8(-2)(-3)$$
$$= 1 + 48 = 49$$

3) If $x^3 - y^3 = 1$ then find $y''(-\sqrt[3]{7}) =$

(a) $-\sqrt[3]{7}/4$
(b) $-\sqrt[3]{7}/8$
(c) $-\sqrt[3]{7}/16$
(d) $-\sqrt[3]{7}/32$
(e) $-\sqrt[3]{7}/64$
(f) none of the above

$$3x^2 - 3y^2 y' = 0 \Rightarrow \boxed{y' = \frac{x^2}{y^2}}$$

$$y'' = \frac{2xy^2 - 2yy'x^2}{y^4} = \frac{2xy^2 - 2y\left(\frac{x^2}{y^2}\right)x^2}{y^4}$$

$$= \frac{2xy^3 - 2x^4}{y^5} = \frac{-2x(x^3 - y^3)}{y^5}$$

$$= \frac{-2x}{y^5} \Rightarrow \boxed{y'' = -2x/y^5}$$

if $x = -\sqrt[3]{7} \Rightarrow (-\sqrt[3]{7})^3 - y^3 = 1$

$\Rightarrow -7 - y^3 = 1 \Rightarrow y^3 = -8$

$\Rightarrow y = -2$

if $(x, y) = (-\sqrt[3]{7}, -2) \Rightarrow$

$$y''(-\sqrt[3]{7}) = \frac{(-2)(-\sqrt[3]{7})}{(-2)^5} = \frac{2\sqrt[3]{7}}{-2^5} = -\frac{\sqrt[3]{7}}{16}$$

Name:	ID:	Sec: 14 22

MATH-101 Term-131 IN-Class-QUIZ-7

(show all your work and circle one letter to get a full mark or you will get zero)

1) If $f(x) = \tan(x + \frac{\pi}{2})\csc(2x)$ then $f'(-\frac{\pi}{4}) =$

(a) $-16\sqrt{2}/(16+\pi^2)$

(b) $-32\sqrt{2}/(32+\pi^2)$

(c) $-2\sqrt{2}/(2+\pi^2)$

(d) $2\sqrt{2}/(2+\pi^2)$

(e) $16\sqrt{2}/(16+\pi^2)$

(f) none of the above

$$f'(x) = \sec^2(x+\tfrac{\pi}{2})\csc(2x) - 2\csc(2x)\cot(2x)\tan(x+\tfrac{\pi}{2})$$

$$f'(\tfrac{\pi}{4}) = \sec^2(\tfrac{\pi}{4})\csc(-\tfrac{\pi}{2}) - 2\csc(-\tfrac{\pi}{2})\cot(-\tfrac{\pi}{2})\tan(\tfrac{\pi}{4})$$

$$= (\sqrt{2})^2(-1) - 2(-1)(0)(1)$$

$$= (2)(-1) = -2$$