Math 141, Sections 7, 9, 19 Quiz #1: September 13, 2012

Name: Key Section:

There are 5 multiple choice problems, and 2 short answer problems. **Write all multiple choice answers in the box provided.** You have 25 minutes to complete the quiz.

Question	Answer
1	A
2	C
3	C
4	E
5	D

1. Completely evaluate the following definite integral:

$$\int_1^{e^5} \frac{2x+3}{x^2}dx = \int_1^{e^5} \frac{2x}{x^2}dx + \int_1^{e^5} \frac{3}{x^2}dx$$

$$= \int_1^{e^5} \frac{2}{x}dx + \int_1^{e^5} \frac{3}{x^2}dx$$

$$= 2\cdot\ln|x|\Big]_1^{e^5} + \frac{-3}{x}\Big]_1^{e^5} = 2\cdot\ln(e^5) - \ln(1) + \left(\frac{-3}{e^5} - \frac{-3}{1}\right)$$

$$= 2\cdot 5 - 0 + \frac{-3}{e^5} + 3$$

(a) $\boxed{13 - \frac{3}{e^5}}$

(b) $11 + \frac{3}{e^5}$

(c) $13 - 3e^5$

(d) $11 + 3e^5$

(e) $11 - \frac{3}{e^5}$

2. Let $f(x) = 2\cdot\sin(x)$. Compute $(f^{-1})'(1)$.

$f^{-1}(1) = x \Rightarrow f(x) = 1 = 2\cdot\sin(x)$

$\frac{1}{2} = \sin(x)$

$\Rightarrow x = \pi/6$

$f'(x) = 2\cdot\cos(x)$

$$(f^{-1})'(1) = \frac{1}{f'(f^{-1}(1))} = \frac{1}{2\cdot\cos(\pi/6)} = \frac{1}{2\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}}$$

(a) $\sqrt{2}$

(b) $\frac{\sqrt{2}}{3}$

(c) $\boxed{\frac{1}{\sqrt{3}}}$

(d) $\sqrt{3}$

(e) $\frac{1}{\sqrt{2}}$

3. Evaluate the following integral:

$$\int \frac{17\underbrace{e^x dx}_{du}}{\sqrt{1-(e^x)^2}}$$

$u = e^x$

$du = e^x dx$

$$= \int 17\cdot\frac{1}{\sqrt{1-u^2}}du$$

$$= 17\cdot\sin^{-1}(u) + C = 17\cdot\sin^{-1}(e^x) + C$$

(a) $17\sin^{-1}(x) + C$

(b) $\frac{17}{2}\sqrt{1-e^x} + C$

(c) $\boxed{17\sin^{-1}(e^x) + C}$

(d) $34\sqrt{1-e^{2x}} + C$

(e) $\frac{17}{2}\sin^{-1}(e^{2x}) + C$

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4. Find the equation for the line tangent to the curve $y = log_2(x)$ at $x = 1025$.

(a) $y - \ln(1025)/2 = \frac{1}{2 \cdot 1025}(x - 1025)$

(b) $y - \log_2(1025) = \frac{1}{1025}(x - 1025)$

(c) $y - 1025 = \frac{1}{1025 \cdot \ln(2)}(x - \log_2(1025))$

(d) $y - \log_2(1025) = \frac{1}{1025}(x - \frac{1025}{\ln(2)})$

$\boxed{\text{(e) } y - \log_2(1025) = \frac{1}{1025 \cdot \ln(2)}(x - 1025)}$

$f(x) = y = \log_2(x)$

$f'(x) = \frac{d}{dx}\left(\frac{\ln(x)}{\ln(2)}\right) = \frac{1}{x} \cdot \frac{1}{\ln(2)}$

A C

$y - f(1025) = f'(1025)(x - 1025)$

E

D

5. Find the derivative of $f(x) = \sin(e^{2x} + 2x)$.

(a) $2e^{2x} + 2\cos(e^{2x} + 2x)$

(b) $2e^{2x}\cos(e^{2x} + 2x) + 2$

(c) $e^{2x}\cos(e^{2x} + 2x) + 2\cos(e^{2x} + 2x)$

$\boxed{\text{(d) } 2e^{2x}\cos(e^{2x} + 2x) + 2\cos(e^{2x} + 2x)}$

(e) $2e^{2x}\cos(e^{2x}) + 2\cos(2x)$

$f'(x) = \cos(e^{2x} + 2x) \cdot (2e^{2x} + 2)$

$= \cos(e^{2x} + 2x) \cdot 2e^{2x} + \cos(e^{2x} + 2x) \cdot 2$

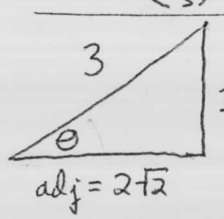
$=$

Let $\sin(\theta) = \frac{1}{3}$. Find $\tan(\theta)$

6. (2 points). (Show all work). Find $\tan(\sin^{-1}(1/3))$. You may assume that $0 < \theta < \frac{\pi}{2}$.

$\theta = \sin^{-1}\left(\frac{1}{3}\right)$ | $\sin(\theta) = \frac{1}{3} = \frac{opp}{hyp}$

triangle: 1 pt



$adj^2 + 1^2 = 3^2$

$adj^2 = 8$

$adj = \sqrt{8} = 2\sqrt{2}$

$\tan(\sin^{-1}(\frac{1}{3}))$

$= \tan(\theta) = \frac{opp}{adj}$

$= \boxed{\frac{1}{2\sqrt{2}}} = \boxed{\frac{1}{\sqrt{8}}} = \boxed{\frac{\sqrt{2}}{4}}$

answer: 1 pt

all 3 are OK.

7. (3 points). (Show all work). If $f(x) = x^{\ln(x)}$, find an equation for $f'(x)$.

$y = f(x) = x^{\ln(x)}$

$=u'v+uv'$

take ln: 1 pt $\qquad \ln(y) = \ln(x^{\ln(x)}) = \ln(x) \cdot \ln(x)$

derivative: 1 pt $\qquad \frac{1}{y}y' = \frac{1}{x} \cdot \ln(x) + \ln(x) \cdot \frac{1}{x} = \frac{2}{x}\ln(x)$

Find answer 1 pt $\qquad y' = y \cdot \frac{2}{x} \cdot \ln(x) = \boxed{\frac{x^{\ln(x)}}{x} \cdot 2 \cdot \ln(x)}$

$= x^{\ln(x)} \cdot \frac{2}{x} \cdot \ln(x)$

$= \frac{x^{\ln(x)}}{x} \cdot 2 \cdot \ln(x)$

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