Math 1220-006 (Calculus II), Fall 2016

Homework 3 Grading Key

- Total score = completeness points + correctness points

Completeness (5 points)

- Points are awarded based on the following table:

Points	0	1	2	3	4	5
Percentage of problems attempted	<60%	60-69%	70-79%	80-89%	90-99%	100%

- In order for a problem to count as attempted, there must be some kind of work present. Simply writing down the problem doesn't count.

Correctness (5 points)

- Every week certain problems are selected for individual grading. Correct answers are only worth a small portion of the points. The majority of the points come from demonstrating conceptual knowledge and showing the calculations or reasoning that led to an answer.

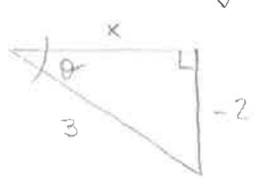
- This week, the following problems were selected for grading:

  6.8 #25, #41, #59
  6.9 #19, #41

6.8 #25 (1 point)

Evaluate $\cos\left[2\sin^{-1}\left(-\frac{2}{3}\right)\right]$.

- Construct right triangle and/or use trigometric identity (1 pt.):



$\theta = \sin^{-1}\left(-\frac{2}{3}\right)$ ✓

$x^2+(-2)^2 = 3^2$

$x = \pm\sqrt{5}$

$\cos(2\theta) = \cos^2(\theta) - \sin^2(\theta) = 1 - 2\sin^2(\theta) = 2\cos^2(\theta) - 1$

Using the third equivalence:

$\cos(2\theta) = 2\cos^2\theta - 1 = 2\left(\frac{\sqrt{5}}{3}\right)^2 - 1 = \boxed{\frac{1}{9}}$

6.8 #41 (1 point)

Find $\frac{dy}{dx}$ if $y = \ln(\sec x + \tan x)$.

- Find $\frac{dy}{dx}$ by differentiating the natural logarithm and applying the Chain Rule (1pt.)

$\frac{dy}{dx} = \frac{1}{\sec x + \tan x} D_x(\sec x + \tan x) = \frac{1}{\sec x + \tan x}\left(D_x \sec x + D_x \tan x\right)$

$D_x \sec x = D_x(\cos x)^{-1} = \frac{-\sin x}{-\cos^2 x} = \sec x \tan x$

$D_x \tan x = D_x \frac{\sin x}{\cos x} = \frac{\cos^2 x - (-\sin^2 x)}{\cos^2 x} = \sec^2 x$

$\frac{dy}{dx} = \frac{1}{\sec x + \tan x}\left(\sec x(\tan x + \sec x)\right) = \boxed{\sec x}$

6.8 #59 (1 point)

Evaluate $\int_0^1 e^{2x}\cos(e^{2x})\,dx$.

- Use u-substitution with $u = e^{2x}$ (0.5 pt):

$$u = e^{2x}$$
$$du = 2e^{2x}\,dx \qquad \int_0^1 e^{2x}\cos(e^{2x})\,dx = \frac{1}{2}\int_0^1 \cos u\,du$$
$$\frac{1}{2}\,du = e^{2x}\,dx$$

- Find antiderivative, evaluate integral (0.5 pt.):

$$\frac{1}{2}\int_0^1 \cos u\,du = \frac{1}{2}\Big[\sin u\Big]_0^1 = \frac{1}{2}\Big[\sin(e^{2x})\Big]_0^1 = \boxed{\frac{1}{2}\left[\sin(e^2) - \sin(1)\right]}$$

6.9 # 19 (1point)

Find $D_x y$ of $y = \ln(\sinh x)$.

- Find $D_x y$ by differentiating the natural logarithm and applying the Chain Rule (1 pt.):

$$\frac{dy}{dx} = \frac{1}{\sinh x} D_x(\sinh x)$$
$$= \frac{1}{\sinh x}(\cosh x) = \boxed{\coth x}$$

6.9 #41 (1 point)

Evaluate $\int \frac{\sinh(2z^{-\frac{1}{4}})}{\sqrt[4]{z^3}}\,dz$.

- Use u-substitution with $u = 2z^{-\frac{1}{4}}$ (0.5 pt.):

$$u = 2z^{-\frac{1}{4}}$$
$$du = -\frac{1}{2} z^{-\frac{3}{4}}\,dz \qquad \int \frac{\sinh(2z^{-\frac{1}{4}})}{\sqrt[4]{z^3}}\,dz = 2\int \sinh u\,du$$
$$2\,du = z^{-\frac{3}{4}}\,dz$$

- Find antiderivative (0.5 pt.):

$$2\int \sinh u\,du = 2\cosh u + C = \boxed{2\cosh(2z^{-\frac{1}{4}}) + C}$$